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ADDRESSES AND ORIGINAL ARTICLES

UNSUCCESSFUL APPENDICECTOMY*

BY ARTHUR EDMUNDS, C.B., M.S. LOND., F.R.C.S. ENG.

SURGEON TO KING'S COLLEGE HOSPITAL

THE patient is a young man, or a young woman, in the early twenties, who, for the past year, has suffered from recurring attacks of pain and tenderness in the right side of the abdomen. These have been accompanied, sometimes, by fever and vomiting, and have been getting more severe with shorter intervals between them. Appetite is poor, and often, after meals, there is discomfort and an unpleasant sense of fullness; life is losing its keen edge; work, which once was intensely interesting, is now a labour; and games are played without enthusiasm. At last a diagnosis of chronic appendicitis is made and an operation performed. A few hours' discomfort and the whole scene changes. Health, vigour, and enthusiasm for life return, and the surgeon has a friend for life.

All of us have had this pleasant experience and, if all our cases had such a history, a surgeon's life would be wonderful and care free. But however careful we may be in examining our cases, however painstakingly we operate, and however great our experience, we get our disappointments. We can tell our patient that he will not die of acute appendicitis, but it is all too obvious to him that, beyond this, he has got nothing for his trouble.

It is, of course, quite easy in many cases to be certain that the appendix which is being removed is definitely abnormal, and can be reasonably associated with the patient's symptoms. There are, however, cases in which the abnormalities are so slight that one is left doubting whether the very definite symptoms can have been produced by such indefinite lesions. None the less, many of these patients are completely cured, and their whole lives are lifted to a higher plane of physical well-being. Some cases of this kind and some in which there are definite lesions of the appendix are disappointing. The patient is no better, and it is obvious that there is another factor in the case.

I propose in this lecture to discuss this state of affairs. I have no panacea to give you which can be injected and cure all these patients. I have no new theories to propound, nor do I intend to give a critical account of what others have thought and written on the subject. I want merely to give my own personal experience.

Pain in the Abdominal Parietes

The abdominal wall is a fibromuscular sheet and liable to all the affections of fibrous and muscular tissue. It is quite possible to get fibrositis, localised to a part of the abdominal wall, which may simulate intra-abdominal tenderness. In such cases one can often pinch up a fold of the abdominal wall, and elicit tenderness without pressing on the viscera.

The commonest cause of pain in the abdominal wall is weakness of its muscles. If a normal muscle has to undertake abnormal work it aches; and if a weak muscle has to do the task, which its normal homologue could have done without discomfort, it aches in the same way. This type of case is generally labelled "visceroptosis" and given an abdominal belt, which relieves the discomfort; and the patient is told that this good result is due to misplaced organs being restored to their normal position. To aid in the good work, divers pads and plates are incorporated in the belt. On this theory countless kidneys were sutured to the ribs, livers slung on to the diaphragm and to their margins, colons and stomach sutured so as to restore them to their normal position. Such operations have, and I consider with justification, fallen largely into disrepute, and are only performed under very exceptional conditions. It is always rash, and generally inaccurate, to be dogmatic, but I believe that practically all the symptoms put down to visceroptosis are due to aching of the abdominal wall, and have nothing to do with the viscera at all.

ABDOMINAL SUPPORTS

The abdominal cavity is a bony framework filled in with muscles, and one may consider it as divided into four parts (Fig. 1):—

(A) The part within the shelter of the ribs.

(B) The waist, where there is the bony spinal column behind and all the rest is soft muscle.

(C) The region of the false pelvis in which there is bone at the back and at the sides, the front alone being muscular.

(D) The true pelvis supported by bone all round and closed by the pelvic diaphragm below.

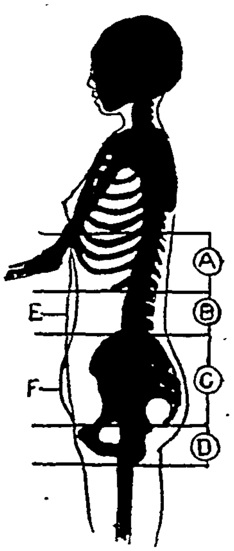

FIG. 1.—Described in text.

It is with region C that we are most concerned, as it is this region that bears the brunt of the pressure of the viscera. (Region D has many analogies and many fibromuscular troubles but these are outside our province.) In this region—of the false pelvis—there is always a tendency to bulge, even in young people. It can be seen in any artist's study of a normal female figure—not drawn with any intention of illustrating this point, especially if the girl is tired; below the umbilicus the abdomen sags.

In the active figure with braced musculature, the line of the abdominal wall drops with a slight curve from the ensiform cartilage to the symphysis; but when it is weakened or fatigued, it falls into a bulge below the umbilicus. This was accentuated in our grandmothers' days by the corset which compressed the region of the waist and the lower ribs, forcing the viscera downward and distending the abdominal wall into a protuberance which was concealed beneath the extensive skirts. I have seen an old woman among my out-patients who wore a pair of stays which increased her abdominal circumference in the region of the false pelvis by six inches.

Preceding the disuse of corsets by young women, another pattern was introduced in which the whole abdomen was supported from the symphysis upwards; and I was told by a firm of Hanover-square dressmakers that their models wore this for athletic exercises—I am speaking of a quarter of a century ago. Thus the figure of the famous "Gibson girl" of those days, and especially of her mother, really showed the way in which, in my opinion, abdominal supports should be made. I have always held that abdominal supports should be made of unyielding material, not of the elastic webbing which is so popular with surgical instrument makers. Elastic must press if it is to support, and all too soon it perishes and yields. What is needed in all supports, which supplement muscular action, is an apparatus which only comes into action when the muscle relaxes from fatigue.

---

* Hunterian lecture delivered before the Royal College of Surgeons of England on Jan. 23rd, 1933.

The first belt I designed was made on the pattern of the many-tailed bandage; strips of stout webbing were sewn to a "back" pinned in front to a pair of steels bearing eyelet holes. These straps were arranged so as to lie smoothly over the hips and were marked temporarily. The belt was then removed from the patient and the straps sewn together. Many of these have been made and the primitive apparatus has developed into an attractive garment.

A cheaper simpler pattern which I have used, specially for men, consists of straps which buckle independently. This has the advantage that it need not be made specially for each patient. It is a bit clumsy, but is a very efficient support.†

In young women, especially when the abdominal weakness is a passing disability, I use a modification of an ordinary pair of stays. These should be long, and rather small for the patient. Two laces are used. The lower lace extends from the region of the umbilicus downwards, and is provided with draw loops in the middle.

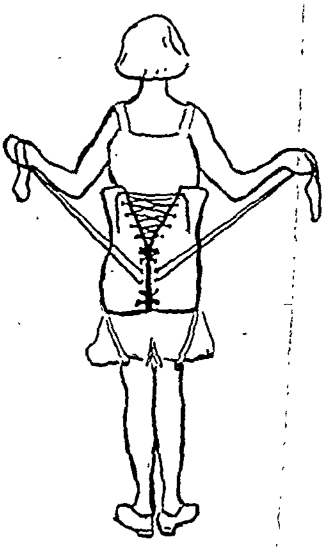

FIG. 2. — Diagram to show position in which the lower lace of stays should be drawn to act as an abdominal belt.

It can be put on while the patient stands (Fig. 2). She should hook the front busks and draw the corset down until these project just beyond the symphysis. Then, holding her head erect and throwing her shoulders back, she grasps the laces, pulling them upwards and outwards and drawing them as tightly as possible. She will be conscious while doing so that her recti are taut and her abdomen flat. The lace is then tied. The rest of the corset is then laced so that it just touches the patient, without any constriction at all. The suspenders are fastened far back; the middle ones to the stockings just over the inner hamstrings, and the outer ones over the outer hamstrings, so as to keep the front of the corset well down and in apposition to the pubis.

This form of corset lacing is very valuable. In many cases it serves all the purposes of an abdominal belt, and I feel that there is less risk of inducing hypochondriasis in advising a young woman to wear corsets for a few months than in putting her into a "surgical belt." Incidentally the corset costs only a very few shillings.

These then are my views on abdominal belts; and the underlying principle is that the part of the abdomen, corresponding to the false pelvis, is now surrounded on all sides by firm material—bone on three sides, corset on the fourth. I do not consider that metal plates are necessary. They may be incorporated in a belt, such as I have described, and will add to the rigidity of the support; but they should not, in my opinion, exercise pressure—the function of the belt being to assist the musculature and not that of supporting misplaced proptosed viscera.

Here then is a very simple procedure. The patient complains that she is no better after the operation; make her stand erect and it may be that it will be seen at once that the lower abdomen has a globular bulge. Place the flat of one hand over this area, with the other over the lumbar spine, and gently press upwards and backwards. It may be that the patient will at once experience relief and comfort, and one can then be fairly confident that a well-fitting belt will help her.

It must be remembered that this weak abdominal wall is not only found in the middle-aged multipara but also in the young and slim nullipara. In the former case some support may be needed indefinitely, but in the younger patient definite attempts must be made to improve the muscular tone of the abdominal wall in the hope that it will soon be competent to bear its normal burden without protest.

Evacuation of the Bowels

The next factor which must be considered is one which is so obvious that it might seem unworthy of mention. I find, however, that, in spite of all that has been written on the action of the large intestine, the mistake is still made of taking at its face value the patient's statement that his "bowels act properly" or that he "always attends to them." A careful cross-examination of the patient commonly elicits the history that he often passes hard fæcal masses, with occasional diarrhœa, or that his motions are habitually very offensive, all of which indicates that things are not as well with him as he supposes. Although he may have a daily action, the bowel is incompletely emptied—there is retention with overflow. I am in the habit of pointing out to such patients that they are in the position of a man who has a weekly payment of £1 to make, but who only pays 15s. He pays every week—something—but accumulates a debt which may require drastic measures for its liquidation. I find, too, the error is very commonly made of assuming that copious purgation means that the colon is emptied. This is far from being true. If a foreign body, such as a large gall-stone, passes into the small intestine this will move along until a spasm of the bowel grips it and symptoms of intestinal obstruction come on. If the spasm relaxes, the intestinal contents flow by and the symptoms abate, generally reappearing in a short time. A slowly growing mass in the colon does not seem to have the same spasm-producing action, and the intestinal contents can flow by.

A few years ago I was asked to come to the operating theatre as my colleague, the late T. P. Legg, had something interesting to show me. He was operating on a young man who had an abdominal tumour. I was shown an enormous bowel, opened and containing a fæcal mass the size of a cannon ball. This was removed together with several other masses the size of cricket balls, and a colotomy was performed; smaller masses passed after this, the colon shrank down to normal size, and the colotomy was subsequently closed, the patient making a perfect recovery (with a complete sympathetic nervous system!). He had no obstructive symptoms, with a fæcal mass so large that it never could have passed by the natural channels. It is not difficult therefore to see how scybalous masses may and do accumulate in the bowel and resist the action even of a drastic purge.

Constipation is very hard to cure but fairly easy to relieve, so that although the patient is far from being cured a diagnosis can be made. A course of purgatives is unsatisfactory and often inconclusive, and it will generally be found better to administer a course of enemata, preferably in some hospital or nursing-home where the dejecta can be examined and a record made of the general condition. The patient is allowed to have his morning action of the bowels, if possible, and then a simple enema is given. After an hour's rest this is followed by a second one. This procedure is repeated daily until all stale fæces have been removed, the second enema being omitted should it be found too exhausting for the patient. After a few days it may be wise to give the enema on alternate days. It cannot be too strongly insisted upon that this treatment is often a lengthy one. It is not enough to order an enema and, when the nurse reports that the results are excellent, to be satisfied that fæcal retention at any rate is not the cause of the patient's discomforts. It may be a couple of weeks before the last of the stale hard masses is passed, although there may have been a copious stool passed as the result of the very first enema.

---

† These are made for me by Bruce and Evelyn, 47, Wigmore-street, London, W.1.

I have, as a matter of interest, pointed out to the ward sister at an operation hard masses in the colon and asked her to report to me when these were passed; and although the patient had, after a few days, good actions, the scybala were not passed for a fortnight. I have had a trained nurse suffering with right iliac pain assure me that whatever the cause of her pains it could not be constipation. At the end of a fortnight's treatment she was convinced, passed the last hard mass, and lost her pain. Further, a patient under this regimen may pass scybala for several days and then perfectly soft and natural fæces. If the treatment is continued, the next day more hard lumps may appear. All this is of course absolutely elementary; it is the very first lesson we all should learn. It is the "A" of the ABC of medicine. Experience has however taught me that the first things are often the last to be learned, and that these things still require to be said and taught not only to the elementary student but to those of riper years.

Once the relationship between a full colon and the symptoms is established, the diagnosis at least is clear, though the treatment may be difficult.

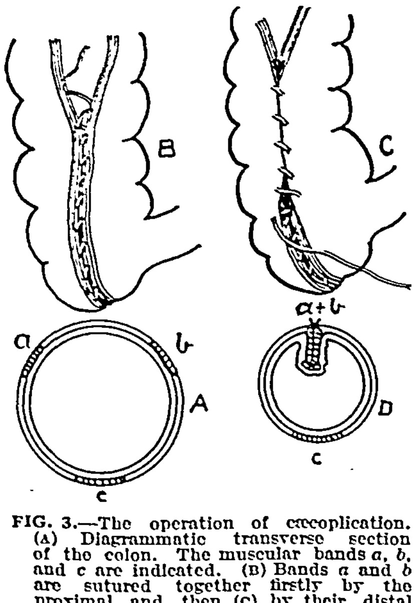

FIG. 3.—The operation of cæcoplication. (A) Diagrammatic transverse section of the colon. The muscular bands *a*, *b*, and *c* are indicated. (B) Bands *a* and *b* are sutured together firstly by the proximal and then (C) by their distal edges, producing a colon shown in diagrammatic transverse section at D.

Uses of Cæcoplication

Pain, of the nature which we are considering, is generally caused by distension of the cæcum, which may be brought about in several ways. There is the fæcal retention we have considered, which should, of course, be eliminated before any operative treatment is considered. Besides this there may be atony of the cæcum, spasm of some part of the bowel beyond, or mechanical obstruction, such as an acute angulation of the colon at the hepatic flexure. Most of these conditions are revealed by an opaque meal.

For the relief of an atonic distended cæcum I am in the habit of performing cæcoplication. I had seen this operation performed, and its possibilities were in my mind when I had a young woman under my care.

She had right-sided pain and tenderness, for which I removed her appendix. All went normally, but she was no better. Radiography revealed a number of calcified glands in the right iliac fossa. These I carefully dissected away, again with no benefit. I then mentally labelled her neurotic, readmitted her to my ward, and asked the sister and house surgeon to watch and try to find out if her pain really was severe. They were convinced of the reality of her pain. I then counter-irritated with a thermocautery, and again no result. Ultimately, as she still suffered a great deal of pain, I reopened the abdomen and plicated the cæcum with the result that she lost the pain immediately and remained well.

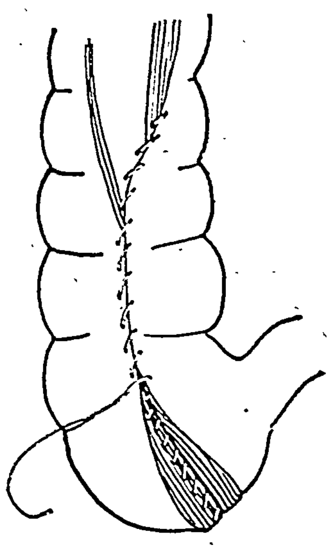

FIG. 4.—Method of completing the plication to avoid overhang at the aboral end of the suture line.

This case convinced me that this operation was worth future trial, and subsequent experience has shown me that it has a very definite value.

Another patient was a young married woman, who had had her appendix removed without any relief. Her husband, who was a doctor, had careful skiagrams taken, which showed a definite, constantly placed, filling defect in the transverse colon. I saw the case with several others, and it seemed impossible to make any other diagnosis than one of carcinoma of the colon. I operated and found the colon absolutely clear of malignant disease. Accordingly I considered her pain was due to a distended cæcum and therefore plicated this. The result was excellent, and the patient was able to lay aside all invalidism and to resume active athletic exercise, which had become impossible.

Cæcoplication is a simple operation which adds very little to the severity of an appendicectomy; indeed, I have sometimes thought that the post-operative course was smoother when this operation had been performed than when the appendicectomy alone had been done.

The adjacent borders of the anterior and postero-lateral muscular band are sutured together for about three inches, starting from the appendix region (Fig. 3). The suture then returns to the starting-point, taking up the other edges of the muscular band, so that the structures are apposed on the flat to each other. The suturing must be accurate, and care must be taken to prevent the colon wall from slipping between the stitches, forming an artificial diverticulum. Often this suture leaves an abrupt upper limit, when the sutured colon overhangs awkwardly. To obviate this I am in the habit of making my suture line leave the postero-lateral band at the hepatic flexure end, picking up the actual wall of the colon and tapering the outline of the colon off neatly (Fig. 4). These procedures are much more easily understood from a diagram.

The operation diminishes the circumference by one-third, and the lineal tension on the musculature is correspondingly diminished for a given intracolic pressure per square inch. This aids the muscular wall of the bowel in propelling its contents along, and also diminishes the space in which these contents can be retained.

Prevention of Adhesions

Although cæcoplication adds, as I have said, very little to the severity of the operation, I do not recommend that it should be performed as a routine. The cases labelled "chronic appendicitis" can generally be divided into two groups.

(*a*) The patient has attacks of pain, with intervals of almost complete health and comfort between them.

(*b*) The patient has chronic pain and discomfort with exacerbations. He is never completely comfortable.

In the former a simple appendicectomy is usually all that is necessary, but in the latter group the surgeon must consider very carefully whether something more may not be needed if the patient is to be cured.

Many patients who still have pain after appendicectomy are told that this is due to adhesions, and that these must be regarded as a sort of "Act of God" and put up with. These adhesions are said "to drag on the bowel," and it is suggested that if the patient will only tolerate them they will in time disappear and all will be well.

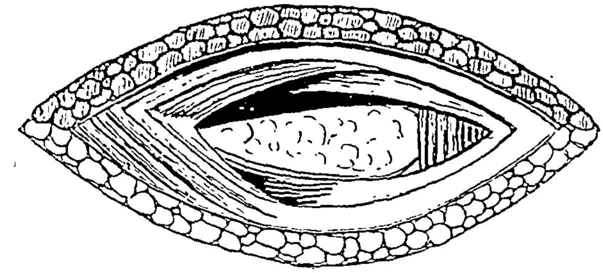

FIG. 5.—Muscle-splitting operation to show the transverse division of the sheath of the rectus.

I have always been sceptical about the "dragging on the bowel" theory. It is a commonplace that a patient may have extensive adhesions and no pain at all. Adhesions, however, certainly do cause pain when they produce a kink in the bowel, causing partial obstruction and distension on the oral side of the kink.

It is therefore obviously necessary in this operation to do all that one possibly can to prevent the formation of adhesions. I am not sure that there is not a tendency nowadays to hurry too much over this operation, which is often a very simple one. I would suggest that it is an operation in which fine operating finds a very great reward. There is no need for hurry as a rule, and the surgeon has time for gentle and careful handling, with meticulous peritonisation of all raw areas.

As a matter of fact a simple "interval" appendicectomy should give rise to few, if any, adhesions, especially if care be taken to peritonise any raw areas that may be produced.

DETAILS OF OPERATION

It is easier, in my opinion, to do this with the older ' gridiron " incision than with *that through* the sheath of the right rectus. This latter incision, which is used by many surgeons as a routine, is a most useful one for certain cases, but it has certain disadvantages. It leaves an ugly scar, it is more difficult to suture without catching up the omentum, and when it is used for cases where the diagnosis is uncertain it gives an imperfect access. When the surgeon is performing an exploratory operation it is better, I consider, to make the incision in the midline or rather just to one side of this, retracting the rectus outwards. This can be made opposite to the umbilicus and extended upwards or downwards so as to deal with whatever lesion is found.

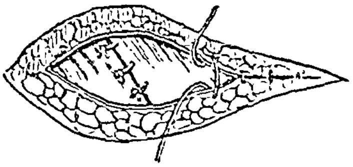

FIG. 6.—Suture of Scarpa's fascia.

When the diagnosis is as certain as it is possible for fallible mortals to make it, the older McBurney's incision has many advantages.

I like to start just to the inner side of the anterior superior iliac spine, and to carry my incision transversely inwards, *in the line of cleavage to the skin, for about* three inches. The muscles are split in the ordinary way, more room being obtained if needed by splitting the rectus sheath through the linea semilunaris, and retracting the muscle inwards (Fig. 5). If further room be needed the superficial incision can be extended, and the deeper incision carried vertically downward in the sheath of the rectus as in the ordinary right rectus incision. This is rather a clumsy proceeding, but it may help in times of unexpected difficulty.

The muscles are sewn together in their natural position after the operation, and I think it is worth *while doing* this carefully, so that the layers of fascia are restored as accurately as possible. I like also to suture the fascia of Scarpa (Fig. 6), which is generally well developed in young people, passing catgut sutures so that the knots lie on its deeper aspect. This avoids an ugly depressed scar, tends to check hæmorrhage, and obliterates dead space in the wound. The skin can be closed very nicely with a subcuticular suture and sealed with collodion.

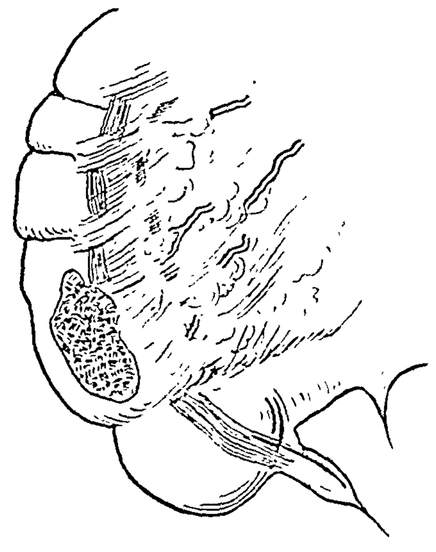

FIG. 7.—Condition found in a case from which only half the appendix had been removed.

I am in the habit of incorporating a marine sponge in the *dressing*—an old method of Lister's. This exercises a gentle pressure over the wound as long as the sponge is moist, and then, as the sponge dries up and loses its elasticity, the pressure is taken off. Marine sponges are treated with suspicion as they cannot be heat sterilised, and it is often assumed that chemical disinfection is unreliable; but I would like to point out that even if 5 per cent. carbolic acid is distrusted, one can feel pretty confident that no bacteria can survive 24 hours' immersion in the 10 and 20 per cent. hydrochloric acid which is used in the preparation of these sponges. Certainly at *King's College Hospital* we have used marine sponges sterilised with 10 per cent. hydrochloric acid and 5 per cent. carbolic for many years with complete safety. I still use them a good deal, especially for drying the peritoneal cavity, removing blood, &c., and other fluids.

To return to the treatment of the peritoneum before closing the wound. I always like to oversew the point where the purse string has been drawn together. I think I have seen trouble where the purse string has worked loose, although I have never seen a case in which it was necessary to reopen the abdomen. This suture, which reinforces the purse string, I carry downwards, drawing together and infolding any raw area made by the separation of adhesions and by the division of the mesenteriolum. This not only peritonises some small raw areas, but compels the surgeon to revise his hæmostasis. Serious hæmorrhage is of course rare, but even a small amount may give rise to adhesions and obstructive trouble. With the gridiron incision it is usually possible to suture the parietal peritoneum so that the cut edges are everted and only a smooth dimple left on the intra-abdominal aspect.

These are all small points, but I believe that they are all worth attention and tend to produce wounds which are forgotten happily.

SUPPURATION

In suppurating cases, adhesions must of course form if inflammation is to be localised. In such cases it is obvious that the sooner the inflammation subsides the less will be the denseness and extent of the adhesions, and the quicker they will disappear. I believe that to bring this about there is nothing so efficient and certain as thorough drainage.

Periodically the fashion crops up of using a minimal amount of peritoneal drainage, of sewing up completely cases in which there is definite infection, or of "getting the tube out as quickly as possible." I am persuaded that this is a faulty policy and a fruitful cause of residual abscesses, although I am quite aware of the miracles in the way of overcoming infection of which the peritoneum is capable. I am also aware that it is maintained that infection can be introduced through a drainage-tube, although as I have never forsaken the old-fashioned Listerian technique I have suffered very little from this in my own work.

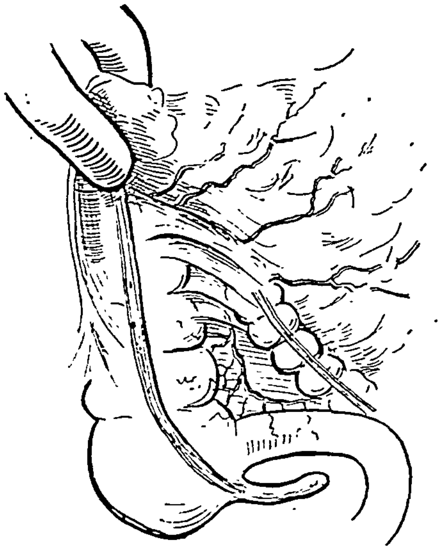

FIG. 8.—Angulation of cæcum with long stump of the appendix. The patient had been told her appendix was removed twenty years before.

The severest abscess may rupture spontaneously and the drainage may be very efficient—for example, I had under my care a woman who had ruptured an appendix abscess on three different occasions either into the rectum or vagina. I anticipated the most formidable adhesions, but to my surprise and relief there were only a few filmy ones, which were dealt with very easily.

The distribution of the adhesions met with at an operation for a completely quiescent appendix often shows very clearly that in the preceding attacks the inflammation had been very widespread.

In one case the omentum was adherent right down to the ileocæcal valve and to the abdominal wall at the same level, causing acute angulation of the colon (Fig. 7). In this particular case, although the patient had been told that her appendix had been removed, a good half of this had been left behind. There was also a well-marked kinking adhesion at the termination of the ileum as well.

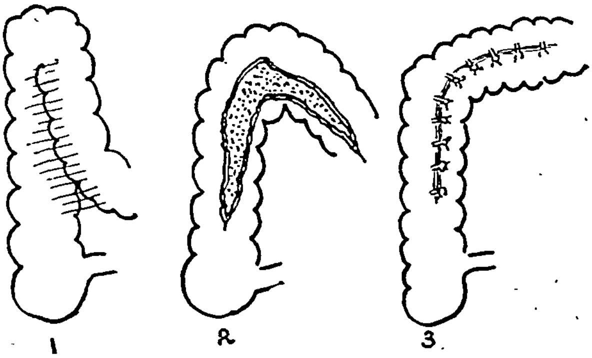

FIG. 9.—Plastic operation on the peritoneum for angulation of the colon.

In another similar case the appendix was still more complete (Fig. 8). The omentum was adherent right down to the cæcum, and the ascending and transverse colon were closely bound together by bands of adhesion. This patient had also been told that her appendix had been removed about 20 years before, in spite of which she suffered very considerably from local pain and reflex dyspepsia. All of these disappeared after a second operation.

In each of these cases I removed the appendix and liberated the attached border of the omentum—to allow the angulation to be undone—and plicated the cæcum, a procedure which enabled me to turn in the rough edge left by the detachment of the omentum and, in the first case, by the adhesion to the abdominal wall. The ileal adhesion was also dealt with by division and plastic suturing of the peritoneum.

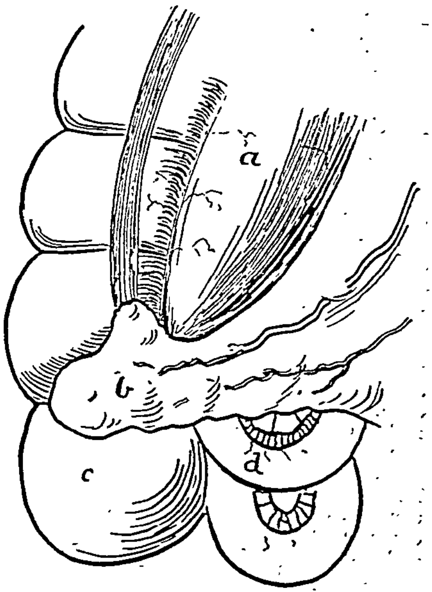

FIG. 10 [illegible] ture following sup- [illegible] gut. (a) Distended [illegible] imately to be con- [illegible] adherent omentum. (c) Cæcum.

In dealing with angulation of the cæcum it is not enough simply to divide the adhesions—a deliberate plastic operation on the peritoneum must be performed (Fig. 9) much in the way that a plastic operation is performed when the arm is adherent to the thorax after a severe burn.

The division of the adhesions produces an elongated rhomboidal raw area, which should be covered by peritoneum as completely as possible. In dividing the adhesions scissors or a scalpel should be used so as to divide them cleanly and leave a definite edge which can be sutured; blunt dissection or "sponge dissection" leaves the peritoneum torn and curled up, and it is impossible to reperitonise the area satisfactorily.

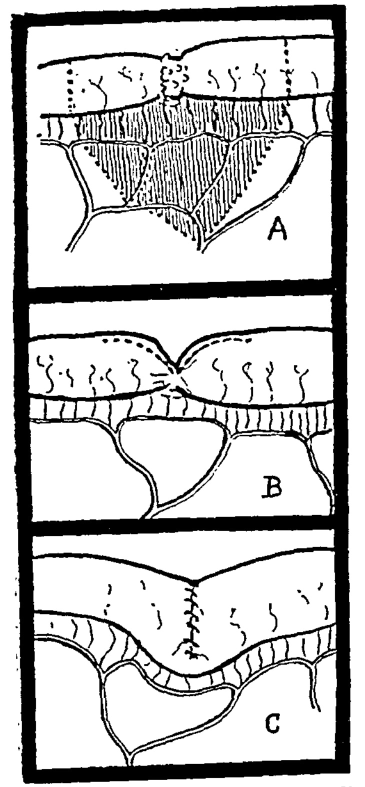

FIG. 11.—Anastomosis of small intestine. A, usual method for comparison. B, incision along ante-mesenteric border. C, operation completed.

In the cases I have just described the condition is probably the result of a widespread peritonitis of moderate severity. When the infection is not only widespread but severe, abscesses may form between the coils of intestine. Such cases may be recognised and dealt with. If nothing is done, the patient may die or the abscess may burst into a neighbouring coil of bowel and the patient recover after a stormy convalescence. If the drainage into the bowel is free, the abscess may clear up with little subsequent trouble, but if the rupture is not so fortunately placed there may be prolonged internal suppuration, with the formation of much granulation tissue, which subsequently contracts and gives rise to severe stricturing.

An interesting case in point is the following :—

A middle-aged man had his appendix removed in the acute stage. He had a prolonged convalescence, with much suppuration and fever. All this settled down ultimately and his wound healed. He did not remain well however; for every month or so he had severe colicky attacks to the right of the umbilicus resembling biliary colic. An X ray examination showed nothing at all—rather curiously as the sequel shows—and I advised him to undergo a second operation.

I opened the abdomen just to the right of the middle line and immediately came upon a dilated and hypertrophied coil of small intestine, passing almost vertically downwards towards the old scar, to which the omentum and the ascending colon were densely adherent (Fig. 10). It was impossible at this stage to see the exact relationship of the various coils of gut, and although it would have been quite easy to anastomose the dilated coil to a normal one I was afraid to do so, for fear of short circuiting a considerable portion of the small intestine. I endeavoured to separate the adhesions and to bring the whole mass outside the abdominal cavity. Although I realised that there was a great risk of opening the colon in detaching it, and that this accident would be very likely to cause a lot of trouble, I had the misfortune to tear a hole in the colon and to soil the wound. Fortunately this led to no serious results in the long run, although there was some troublesome suppuration.

I closed the tear and proceeded with my investigation. I found a dense stricture of the small intestine, to which a fibrosed area of the omentum was attached, the whole being bound together by very dense fibrous tissue. It was an excellent demonstration of the degree to which the small intestine can be constricted without obstruction symptoms, provided of course that the stricture develops slowly and without any spasms. I was able fortunately to excise the stricture without interfering with the mesentery, as in an enterectomy for disease (Fig. 11 A). By making a simple longitudinal incision through the stricture (Fig. 11 B), with a little trimming of the edges, I produced a wound in the bowel which came together nicely and restored the lumen quite satisfactorily (Fig. 11 C). I was then able to close the wound with good drainage and, apart from the suppurating caused by the tear in the bowel, convalescence was uninterrupted and the patient recovered completely. Fig. 12 shows what I consider to have been the stages in the development of this case.

Cases of this kind are among the most difficult that a surgeon has to deal with. No two of them are exactly alike and one operation must be planned at the time, remembering always that it is the handling of the viscera while searching for "what to do" rather than the doing of it that exhausts the patient.

Incomplete Operations

When a surgeon, confronted with an appendix abscess, decides to drain the abscess and not remove the appendix it is orthodox, and in my opinion imperative, to advise the removal of the appendix at a subsequent operation. It is fully recognised that an appendix which has been the cause of an abscess may still cause trouble and produce a second abscess or even a third, and it is just as true that an appendix which has been incompletely removed may give rise to symptoms, the nature of which may be overlooked, the diagnosis being obscured by the history of the preceding operation. Fortunately an opaque meal often settles the question, but it must not be taken as giving infallible evidence. The appendix may be represented by a very short stump, which does not fill with the barium but can still cause symptoms; just as a small diverticulum elsewhere in the colon can, if inflamed, give rise to all the symptoms of diverticulitis.

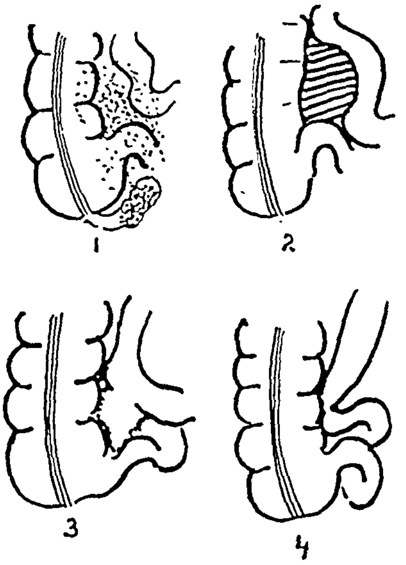

FIG. 12.—Suggested genesis of condition shown in Fig. 10. (1) Diffuse inflammation. (2) After removal of the appendix an abscess forms. (3) The abscess ruptures into the small intestine which drains badly; the patient recovers, but (4) develops a severe stricture.

It was at one time customary, in removing an appendix, to turn down a cuff of the outer coats. The rest of the appendix was ligatured, cauterised, and cut away, the cuff being then turned down again and ligatured to form a covering for the stump. I still adhere to this procedure, but for rather a different reason; that is to say, not to form a covering to the stump—for this is better done by the purse-string suture—but to ensure that the whole of the appendix has been removed. Usually it is not difficult to crush or ligature close up to the cæcum, but occasionally the appendix is thickened and adherent to the cæcum, and it is not easy to be sure that the last fragment of it has been removed. In such cases the formation of a cuff removed this difficulty entirely and obviates the risk of leaving a troublesome diverticulum behind (Fig. 13).

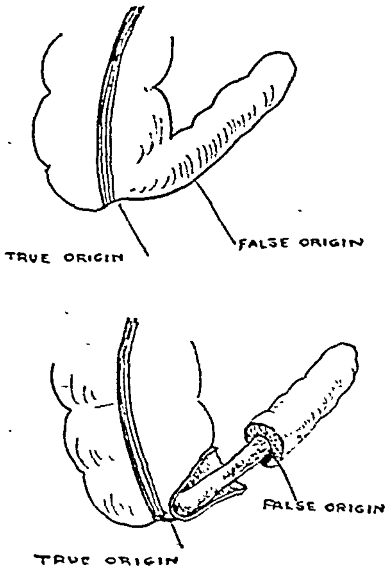

FIG. 13.—The cuff method to show how this ensures complete removal of the appendix.

Excision of the Cæcum

After all the points I have mentioned have been considered and dealt with or eliminated, there is still a residuum of cases in which there is chronic pain with tenderness in the right iliac fossa of intestinal origin. Here is a good example :—

A middle-aged woman came under my care with the symptoms of chronic appendicitis. I removed the appendix and she was no better. I eliminated any question of intestinal stasis amenable to medical treatment, and then plicated her cæcum. The result was disappointing; she complained of constant pain, and was extremely depressed, and it would not have been an extravagant diagnosis had she been considered as suffering from mild melancholia. I was convinced that her symptoms were intestinal in origin, and accordingly removed her cæcum and ascending colon, anastomosing the small intestine to the beginning of the transverse colon. The result was dramatic; in a few days, almost before the shock of the operation had worn off, the patient was completely changed. Her expression from being that of the deepest gloom became a normal and happy one, a true index of the change in her condition in every way. This improvement was maintained and she made a most excellent recovery.

In Removal of the Cæcum

In removal of the cæcum there is a small point which is worth noting. After marking out the mesocolon to be removed and before dividing the bowel, I start the suture of the mesocolon. Everything at this stage is stretched out nicely, and it is much easier to do this now than after the bowel has been removed. One cannot of course complete the suture, but a few stitches can be put in and ensure the completion of the suture towards the middle line.

The operation has been criticised on the grounds that it entails retention of intestinal contents which are fæcal in nature in the highly absorptive terminal portion of the ileum. In the case just quoted this certainly did not happen, but I have seen one case which gives some support to this view.

A young woman came to me with sinuses in the right iliac region following an operation for what was assumed to be a psoas abscess, but was in reality a tuberculous appendicitis. After dealing with some extending suppuration, a barium meal was given revealing extensive stricturing of the ileum. It was obvious that something had to be done, and I successfully excised the whole mass—cæcum, stricture, and appendix. The patient made a good recovery from the operation, but a few weeks later she developed a true melancholia which took a year to clear up. At the end of this time she regained her normal mental health.

I do not think that such cases are common, and it is doubtful whether it is worth while performing an elaborate transplantation of the ileocæcal valve.

Excision of the cæcum is of course a serious operation, but in certain cases it is unquestionably justified.

MECHANICAL BASIS OF PERIODICITY IN WUCHERERIA BANCROFTI INFECTION

By Clayton Lane, M.D. Lond.
LIEUT.-COLONEL, I.M.S., RETD.

For some months a return to consideration of the mechanical basis of microfilarial periodicity in *Wuchereria bancrofti* infection has been justified by the work of F. W. O'Connor, of Columbia University, New York. Such of his results as are pertinent to this matter he has most generously placed at my disposal. A paper by G. C. Low, P. H. Manson-Bahr, and A. H. Walters [12] furnishes a suitable occasion.

Some recapitulation is first advisable. Dissatisfied with the credibility of the current theory of the cause of periodicity, I reviewed the literature,[7] and concluded that it was not reasonably possible to accept the suggestion that when absent from the skin blood *Microfilaria bancrofti*, which on a slide cannot maintain its position against very slight currents, could hold its own in the overwhelming torrent of the large vessels of the thorax or could harbour in some capillary haunt still undiscovered after 50 years. I concluded that the known facts had a cumulative weight in favour of the hypothesis that there was daily simultaneous cyclical parturition by the female worm, and that the microfilariæ perished rapidly—at least daily. In the paper just noted [12] this is described as a novel and revolutionary theory. It is well, then, to point out that over 51 years ago Dr. Patrick Manson, as he then was, wrote thus to The Lancet [13] :—

> "The facts connected with filarial periodicity may best be explained by one of two suppositions: (*a*) the parent worm empties her uterus of mature embryos once every 24 hours, parturition going on from late in the afternoon till midnight, and (as a corollary) the young filariæ living but a few hours in the blood, as Dr. Myers suggests; or (*b*) parturition is a more or less continuous process, the young being nearly constantly carried along the lymphatics and thoracic duct into the blood. In this they live for an indefinite period, circulating with it, under ordinary circumstances, during the night; but for some unknown cause, and after some unknown fashion, becoming fixed during the day. . . . The facts I have stated, and other evidence I do not bring forward at present, lead me to believe that the second hypothesis is the correct one—viz., that reproduction is continuous, and that the embryos are fixed and filtered out in some organ or tissue during the day."

Manson, then, deliberately considered and as deliberately rejected the hypothesis of periodic parturition; and his great reputation laid it to decent rest for some fifty years until I ventured on disinterment, convinced that his death certificate had been wrongly drawn. To question it was undertaken with no light-heartedness, and the act has been received with the expected lack of enthusiasm. To O'Connor, however, it appealed as something which he could test by serial sections on a massive scale; and the results of his observations may, I think rightly, be described as novel and revolutionary.

FRESH EVIDENCE FOR SIMULTANEOUS CYCLICAL PARTURITION

The accent is on "simultaneous," for all females have, of necessity, a cycle leading to parturition (see Ref. 7, p. 1292, footnote), and the word simultaneous is once again used with loose exactness. By massive serial sections of tissues O'Connor has made carefully conducted observations on seven persons in whom living *W. bancrofti* females were thus disclosed. Operation or death took place about noon (twice), 1 P.M., 3 P.M., midnight, 4 A.M., 8 A.M. Two facts emerge. Firstly, all living female worms found in the same body, or removed from the same person at the same time, have shown the same stage of the developmental cycle. Secondly, parturition takes place about midday, although, as is so well known, microfilariæ reach their highest numbers in the blood about midnight; there is a lag of about twelve hours between their birth and their blood swarming. But this bare statement does not disclose the full force of O'Connor's findings, for as he and Hulse reported [19] :—

> "Believing Lane's hypothesis of cyclical parturition to be correct, and considering later observations made by the author [18] regarding the possible hour of parturition, the following view was expressed at the time of operation: '*If living worms are present the condition of intra-uterine development will be identical in each parasite and, considering the time when the operation is being performed, it is expected that ova but no microfilariæ will be present in the uteri of the parasites.*'" (Italics in original.)

His forecast was exactly fulfilled. The slides are in my care. The contrast between the turgid females, crammed with extended microfilariæ, in a man dying before noon, and these uniformly spent and collapsed females killed about 2 P.M., is very striking. This forecast forms a most stringent check on the rightness of O'Connor's earlier observations. Although, as always, the point will have to be confirmed by others before it can expect to gain general recognition, his observations can be disregarded by no one who views the matter without prejudice—they simply cannot be brushed aside. It is the case, then, that as soon as evidence for simultaneous parturition began to be sought it was forthcoming and in an unexpected manner, for it had, I think, occurred to no one that there would be displayed a cryptic interval of some twelve hours between parturition and the maximum swarming of microfilariæ in the blood. To that point a return is made below.

FRESH EVIDENCE FOR DESTRUCTION OF MICROFILARIÆ

If microfilariæ are born daily in accordance with the evidence just stated, and since their numbers, as in the case cited,[12] may be stable for long periods, it follows that as many of them as are born daily must be removed daily from the blood and destroyed. Evidence for the mode of destruction may conveniently be dealt with from three points of view: destruction in shed blood, in the lymphatic system, and in the blood vascular system.

Destruction in shed blood.—In a discussion such as this which has consisted largely in the marshalling of facts reported by others, the responsibility of one who undertakes to do so lies in discriminating care in their selection. I believed I had fully exercised this when I accepted Bahr's report [1] that in citrated blood microfilariæ never survived at blood temperature for more than 12 hours, while his controls at room temperature lived for three days. Manson-Bahr,[12] however, now associates himself with the statement that microfilariæ are kept alive with comparative ease outside the human host for a week or more, no question of temperature being now raised. I have read in the interval no formal contradiction of the validity of his former statement; but C. V. Natarayan writes [17] to me that in auto-serum he has kept microfilariæ alive in closed chambers at 37° C. for at least 126 hours, deterioration becoming visible after 72 hours. The importance of temperature at the other end of the scale is shown by the report of S. S. Rao,[20] that under aseptic conditions, and at about 4° C., they can be kept alive outside the body for four to six weeks. But, as is seen below, their life span outside the body has little evident relationship to that within a host which has its own means of showing its intolerance to them.

Destruction in the lymphatic system.—Evidence for this falls into two parts: destruction, firstly, in lymphatic glands of microfilariæ coming to them in the lymphatic trunks from the limbs; and, secondly, in granulation tissue in the testicular region. Regarding *lymphatic glands,* I showed at the Royal Society of Tropical Medicine in March last one of O'Connor's sections of a lymphatic gland whose peripheral part contained over 170 pieces of microfilariæ, some calcifying; with the special note that, though these can be seen to enter the glands in numbers, O'Connor had not yet succeeded in finding any in the efferent vessels. This falls in with the general experience of the behaviour of pigments and bacteria in healthy glands and makes conspicuous a point of view too little considered hitherto in filariasis—namely, the inherent improbability that microfilariæ habitually traverse healthy lymphatic glands. Regarding destruction in the *testicular region,* the same demonstration of O'Connor's slides showed lymphatic sinuses entering the cavity of the tunica vaginalis with calcifying microfilariæ in or about giant cells lying in their walls, and a polyp of granulation tissue guarding the exit of these sinuses into the cavity of the tunica. In this polyp were entangled masses of microfilariæ, some healthy some calcifying, as many as 636 pieces being counted in a single section. Some calcifying microfilariæ were present in the cavity itself. The female from which they came lay in the tunica albuginea. There is strong evidence in these two sets of sections that numbers of microfilariæ never reach the blood at all—that there is massive destruction of them before they do so. This has no direct bearing on periodicity, its indirect one is pointed out below. Yet there are conditions in which it must be allowed that the lymphatic system may be able to deal with microfilariæ which have already entered the blood. Florence W. Haynes and Madeleine E. Field [6] report that lymph in the dog often contains red corpuscles quite apart from venous congestion, that being the condition in which their presence here was first demonstrated by Emminghaus in 1873. *Examination of O'Connor's* sections shows that in them hypertrophied and dilated lymphatic vessels identified by their tumultuous muscular coat and septate lumen, often contain red corpuscles. Since, then, in filarial conditions these can pass from blood capillaries through tissue spaces into lymphatic vessels, it can hardly be doubted that at least *some* microfilariæ take this route, and will presumably be destroyed in the first lymphatic glands they enter. Nevertheless this leakage of blood to lymph can have little practical importance in the destruction of microfilariæ since evidence of blood destruction is not a marked feature of filariasis. On the other hand, the circulation carries microfilariæ to lymphatic glands and other lymphoid tissue (as well as to all other organs), and these can perhaps retain and deal with them whether they come by blood or lymph channels.

Destruction in the blood vascular system.—Low, Manson-Bahr, and Walters [12] report that H. M. Hanschell, at their suggestion, injected into guinea-pigs some 125,000 microfilariæ, which were never seen again in the blood in spite of repeated examinations over 14 hours. Similarly, Frederick Murgatroyd[16] injected 720,000 *Mf. bancrofti* into the blood of a healthy volunteer, with their immediate and complete disappearance therefrom, the examinations covering several days; but he calls attention to the fact that, since two hours elapsed between the drawing of the blood and its reinjection, and there was in the meantime some unsheathing of embryos, the experiment was not perhaps conclusive. These tests are evidently comparable to those of Leonard S. Dudgeon and H. K. Goadby [3] with *Staphylococcus aureus* injected intravenously into rabbits; nearly all cocci were held up in the lungs where they were actively phagocytosed by polymorphs within five minutes of the injection; they were subsequently passed on to other organs, and there phagocytosed by polymorphs and by the Kupfer cells of the liver. So far as they go, these observations are at least compatible with the suggestion that microfilariæ which enter the blood stream are very rapidly removed from and do not return to it. Doubtless they will at once be repeated with attention to the essential point, to be determined on animals—namely, how and by what organ or tissue are microfilariæ so quickly and surely removed from the blood stream, how soon does calcification of embryos make its first appearance, and how rapid is the whole process of their disposal?

It is obvious that the explanation of microfilarial periodicity as due to simultaneous parturition cycles and to the daily death of microfilariæ has now a basis of observed fact considerably greater than it had when I questioned Manson's conclusions and put it forward as the only reasonable explanation of the conditions as then known.

Certain objections to the hypothesis.—The observation is made [12] that no adequate explanation is forthcoming as to what becomes of the millions of embryos which must be destroyed daily if periodicity is due to daily parturition and death of embryos. That is true. But since, as the result of Manson's conclusions, there had been no sustained search on this point for 50 years it is not surprising. It is out of place to raise this as a serious objection so long as no proper investigation into the point has been made. It is further urged in the same paper that massive destruction of millions of embryos and the liberation of this amount of foreign protein is presumably liable to produce considerable reaction in the human body. The answer surely lies in the paper itself. It reports injection into the hearts of guinea-pigs weighing 150 kg. of about 125,000 microfilariæ and 1 c.cm. of human blood. Weight for weight (presumably the only right criterion) this corresponds to the injection into a man of 60 kilos of 5,000,000 embryos and 400 c.cm. of the blood of another animal genus. None of the animals showed the slightest distress, and the microfilariæ, as has been noted, disappeared immediately from the circulation. The writers themselves then furnished the required evidence that the ill-effects they suggest as appropriate have not in fact followed the embryos' disappearance, and so the presumed destruction of what amounts in man to millions of microfilariæ together with a quantity of other foreign protein which, on like reasoning, should represent many more millions of the embryos. The writers ask, too, how a daily cyclical destruction of embryos could explain the phenomenon of non-periodic filariasis. I have never used the term "daily cyclical destruction." Simultaneous cyclical parturition, and at least daily massive or complete destruction of the microfilariæ, are the terms of the hypothesis. It can now be put more exactly—namely, that in the periodic form of *W. bancrofti* there is simultaneous daily parturition, very rapid removal of microfilariæ from the blood, and the destruction daily of as many as are produced, though whether this is in whole or in part completed within 24 hours must be left for experiment to decide.

As an explanation of the daily disappearance of microfilariæ from the blood, alternative to simultaneous parturition with their rapid and final removal therefrom, there is repeated [12] the view of Low [11] that the blood of the heart, great vessels, and lungs forms a special "seat of selection" for these creatures, Low adding that they retire there, and there "rest," till it is time for them to come out at night. That is a definite and simple hypothesis; but how does it work? Everyone having that practical acquaintance with filariasis which these writers have will agree that in drawn blood microfilariæ drift about on the slide at the mercy of insignificant currents. This hypothesis maintains, nevertheless, that in undrawn blood they can keep their position in the overwhelming torrent of the heart and aorta while they are being unceasingly buffeted by projectiles about as wide as their bodies. In this category too lies Low's St. Kitts case [9] relating to the blood-vessels of the lungs, his case of *Dipetalonema perstans*,[10] and his Barbados blackbird in which, however, the habitat of the adult worm is unreported. Magic and will-power being by consent out of the question, there must be some mechanical means by which microfilariæ can maintain their supposed resting position in the currents of heart and aorta. What is it? In the absence of any suggested answer the hypothesis seems to hold a unique position in modern biology.

For positive evidence against the suggestion of simultaneous parturition as the cause of microfilarial periodicity, Low, Manson-Bahr, and Walters [12] produce the careful microfilarial counts made hourly by the last over a period of 24 hours, during which a man showing periodicity was put to sleep for the day with morphine, hyoscine, and luminal. He was up and about for some three hours during the following night, and during this waking period the embryos in 0·01 c.cm. of blood fell from 107 to 75, rising to 102 (or 112) when he slept again. These findings are held to be impossible of reconciliation with simultaneous parturition. The writers' position is, however, anomalous. They quote with approval Manson's words, written in reply to a question by J. Mortimer-Granville,[15] as to whether the appearance of microfilariæ in the peripheral circulation depended on sleep or simply on the advent of night. Manson [13] replied explicitly thus:—

> "It is not sleeping or waking that has this influence. . . . That sleep does not cause the ingress of embryos is evident from the circumstances that egress begins hours before the usual hours of waking, and periodicity is maintained even though no sleep be indulged in for two or three days, and if sleep is continuous, or nearly so, for as long a time."

Yet these writers hold that the diminution of microfilarial numbers during three hours of wakefulness on a single night adds weight to this statement by Sir Patrick, and, moreover, write "that this series of accurate experiments forges yet another link in the evidence which supports the contention that the sleeping and waking states are primary factors in the periodicity phenomenon in this particular infection." The two points of view seem incompatible, indeed antithetical. The experiment as they carried it out is so simple that it will no doubt be widely repeated. In the meantime it would be unwise to conclude that the suggested explanation is necessarily correct, or that the writers' findings outweigh, far less throw out, the increasing volume and weight of the evidence for simultaneous parturition.

Rao [20] has reported two cases in which microfilariæ ceased to be found in the blood two to three months after the removal from their hosts of filaria-containing cysts. He concluded that these constituted the only source of microfilariæ, and that the latter accordingly live in the blood for about 70 days. That confident conclusion implies that the scrotal lymphangitis and abscess for which one of the men was in fact admitted to hospital were certainly not due to filariæ in that region, that the dilatation of lymphatics until they became filaria-containing cysts was certainly not suggestive of more central obstruction, and that it is possible without detailed minute examination of tissues to be certain that there are no adult female filariæ in the body. Seeing that O'Connor and Hulse [19] reported that in three of a group of five glands removed at operation they discovered 21 worms, nine of them alive and seven being temporarily spent females visible, I find, with certainty only under the microscope, I hold Rao's confident assumption impossible of acceptance.

THE TWELVE HOURS' LAG

It is here suggested that the key to the lag of some twelve hours between the time of parturition and that of microfilarial swarming in the blood will be found in the study of the changes which are found in the lymphatic system in filariasis.

Of normal lymph capillaries C. K. Drinker and M. E. Field [2] write :—

> "Modern histology is apparently strongly fortified in the conception of the closed capillary against the old idea that lymphatics open into the tissue spaces. . . . We are inclined to believe that motion or massage, any movement of the tissue in which they exist, causes the lymphatics to lose their anatomical integrity and to become continuous with the lymph spaces."

It appears, too, to be held that the walls of normal lymphatics are lacking in lymph capillaries. But in the abnormality of filariasis in which back pressure of lymph is evident, I am satisfied that matters may certainly be otherwise. While the dominant feature of O'Connor's sections is the evidence for lymphatic blockage still nearer the centre, they also show how local blockage is produced. In this process both adult and embryonic filariæ are concerned. Round an adult the wall of the lymphatic may be normal; on the other hand it may show proliferation, perhaps polypoidal, of the endothelium, and this may finally press on and kill the worm and close the vessel The production of this proliferation Drinker and Field [2] suggest may be aided by concentration of protein in the lymph. This in turn is caused by a combination of inflammation and lymph obstruction; the latter entailing a rise in pressure, with passage of water but not of the large protein molecules, through the walls of lymph capillaries into tissue spaces, the lymph in the capillaries becoming more concentrated—evidently a sort of protein overfeeding. At least this suggestion falls in with the frequent association between lymphangitis and subsequent elephantiasis. Since a favourite habitat of worms is in the afferent vessels as they enter a lymph gland, it follows that, in proportion as these are all closed by this endothelial proliferation, the lymph current which flowed through them will be stopped until recanalisation takes place or collateral channels are opened out short-circuiting the active portions of the gland. As regards microfilariæ, they appear to be concerned in lymph blockage in two ways. Polypoid endothelial growths may be seen projecting into the lumen of the smaller lymphatics. They contain microfilariæ, often calcified, within or without giant cells. The reasonable conclusion is that these obstructing polyps are caused by the embryos. The second microfilarial method of blockage is held to be in the lymph glands. As has been noted above, the passage of microfilariæ through a healthy gland must be at least a rare occurrence, while of their destruction in a gland their appearance gives proof; and it is presumably significant that the gland tissue surrounding their calcified remains may be degenerate, homogeneous, and without nuclei. Moreover, as Dr. J. Bamforth has pointed out to me, many plasma cells are present in the sections of one of the two sets of lymph glands which O'Connor has sent me, but not in the other. Further, it is the case that in the glands which are without plasma cells there is a network of thickened and dilated lymphatic vessels, evidently the result of obstruction yet nearer the centre, while in those in which plasma cells are present no such back pressure effects are evident. If, then, plasma cells appear in response to a call for the destruction of microfilariæ, the difference between the two sets of glands is explicable on the supposition that in the former case the embryos never came into contact with the gland substance proper; that although topographically they passed through the glands, functionally they were by-passed by their imprisonment within the lumen of the thickened vessels which take their tortuous way through these glands. From them larvæ were in fact absent, although the glands contained at their margins the female worms, just sexually spent for the day, which have already been mentioned. On the other hand, microfilariæ in large numbers, some of them calcifying, are present in the gland substance of that set of glands which contains plasma cells. If the two sets of appearances are not the result of mere chance (and only extended observation can settle this point), they suggest that microfilariæ which gain access to gland substance are concerned in the appearance of plasma cells as well as of necrosis, fibrosis, and presumably blockage of lymph flow more or less effective. In these various ways filariæ, adult and embryonic, stop the flow of lymph, and this can be re-established only by recanalisation or the formation of collateral channels which by-pass blockages.

These, then, are methods by which filariæ may cause lymphatic blockage. In its extreme condition (the result of obstruction close to the mouth of the thoracic duct) it is familiar to many through the well-known figure in Manson's "Tropical Medicine," which shows a coiling mass of anastomosing vessels filling the back of thorax and abdomen. Sections of the spermatic cord from O'Connor's Case X.[18] show a like condition on a small scale, a spongework of dilated lymphatic vessels lined with endothelium, bunched together and evidently produced from single trunks. In the disordered and hypertrophied muscular coat of other lymphatic vessels, not so profoundly changed, lie lymph capillary channels, many at least definitely lined with endothelial cells whose nuclei are long and thin when seen in profile, but widely oval when seen in face. In some of them lie microfilariæ, straight, bent, coiled, or seemingly in pairs. In the last case, however, serial sections have shown that there is or may be but one embryo, so sharply doubled on itself that it seems quite impossible that it could by its own movements have taken up such a position. It is suggested that the reasonable explanation of this condition is that, under obstructive pressure, channels of capillary size are mechanically opened out in the walls of lymph vessels, that they become lined by endothelium, that they form anastomoses, and that when lymph flow through them begins microfilariæ are forced into them end-on or sideways. The back pressure still further dilates them until there is produced the spongework and the septate condition just noted, and, when the obstruction is high up, the huge network that Manson's book pictures.

Such a conception of the effects of lymphatic blockage has repercussions which need consideration. Leakage of blood into lymph vessels has been noted. When it occurs it clearly does so because pressure in blood capillaries is higher than in lymph capillaries. But if this condition is reversed, as perhaps it may be when lymph capillary pressure is raised by obstruction, the opposite condition is conceivable, particularly if inflammation is added. Thus Field, Drinker, and White [4] have observed a maximum lymph pressure of about 120 cm. of lymph in the quiescent leg of a dog, the subject of sterile inflammation, although lymph pressure in the legs of dogs under anæsthesia is not normally measurable. There is, I think, evidence of this transposition of pressures in Fig. 10 of O'Connor's paper on Filarial Periodicity.[18] I have had the advantage of examining the original slide and, as his figure shows, two precisely similar veins lie side by side, one contains many microfilariæ and the other none. The section contains dilated and hypertrophied lymph vessels, evidence of high lymph pressure. The most reasonable explanation of the occurrence seems, then, to be that there was rupture of a small embryo-containing lymphatic vessel, with leakage from it into the capillaries of one vein but not into those of the other—that the condition was presumably quite exceptional on such a considerable scale, though it is the case that other sections from the same cord show an occasional microfilaria in a blood-vessel.

The reasoning which has been put forward above is based on observed anatomical appearances, and in so far as it is correct it follows that microfilariæ will not appear in the blood in appreciable numbers until all gland tissue has been by-passed by the laborious process of producing a collateral circulation. There will, then, be a lengthy latent period, after female worms have reached maturity and are positing microfilariæ, before these appear in the host's blood. When speaking of by-passes one must not think of the single spacious thoroughfares which modern motoring associates with the name, but of numerous tortuous narrow by-ways round or through glands in which the stream is sluggish and the transport of embryos slow, but in which these are fairly safe from attack by active gland elements. The slow drift through these tortuous by-paths, each relatively narrow, but in their aggregate probably providing a wide, slow-moving stream, makes intelligible the delay between parturition about midday and microfilarial swarming about midnight. It follows, too, that even were parturition of all females exactly simultaneous, it is unreasonable to suppose that all the embryos which finally reach the blood will encounter an equally difficult road to the great veins, that all can possibly drift into the blood at the same moment. There will instead be produced the long familiar wave of blood swarming, which is the measure of the difference between the numbers that enter the circulation at any moment and those that are removed from it at that same moment.

This conception seems to explain, otherwise than he does himself, another of O'Connor's observations.[18] A temporarily spent female, one in the usual collapsed condition existing just after parturition, lay at the upper pole of the testis, and microfilariæ were found not in the lumen but in the wall of the lymphatics of the cord, from ½ inch above the parent worm through a zone about 3½ inches deep, most of them lying about its middle. Apart from the evidence this affords that parturition is not continuous but quite abruptly cyclical, it seems to be exactly what must occur if microfilariæ merely drift slowly along collateral capillary channels in the wall of a blocked main vessel. Reference has been made above to the conclusion drawn from their attitudes and, as I have pointed out,[8] to consider their presence within the wall as the result of active penetration, such as hookworm larvæ adopt when they enter the skin, implies that microfilariæ when newly posited have a thigmotaxy, that they lose this as soon as they enter a blood-vessel and that they regain it on entering a mosquito's stomach. Moreover, it implies that they can effect this active boring through tissues while still muzzled by their sheaths, and that without breaking and losing them; it being assumed for the moment that this is their normal method of entering the circulation and that they are in channels which they have themselves forced, and not in established capillaries already lined by endothelium. It postulates much in unusual behaviour and changing instincts, whereas the simple explanation suggested above leaves the whole transport to the lymph escalators on which their mother has posited the embryos; and as has been suggested above the slow working of that escalator is such as to explain reasonably and on purely physical grounds the 12 hours' lag between parturition and blood swarming. All which means that an investigation, which sought to check the presence of simultaneous timing of the reproductive cycle in the periodic form of *W. bancrofti*, has already thrown much-needed light on other aspects of the infection and no doubt will throw much more. The conception is proving to be of much practical, and not merely of intellectual, importance.

THE STIMULUS

It is no more immediately profitable now than it was when Mortimer-Granville wrote over 50 years ago to guess regarding the stimulus which produces this "rhythmical phenomenon," as he called it; but it is as certain now as when Manson so definitely stressed this point in reply *to him* that it is not mere sleeping or waking which has this influence. Some stimulus is clearly in action whatever the cause of microfilarial periodicity, and objection to the conception of simultaneous parturition on the ground that this stimulus still remains unknown must be beside the point. Harley's suggestion [5] that what is now a habit originated in some reaction induced by mosquito bites would be rendered invalid only if this were held to act at the moment of parturition, since parturition occurs by day. But there is no evidence that the stimulus, whatever it may be, is applied at the end of the developmental cycle and not, as Harley suggests and as is perhaps more probable, at its beginning. At all events, in filariasis with periodicity, the evidence is that some unknown but certainly existent stimulus causes female worms to posit preponderatingly in unison, but that it has no significant effect on the non-periodic form.

CONCLUSIONS

As has been repeated above, it is no new conception that microfilarial periodicity in *W. bancrofti* infection is due to simultaneous parturition. This suggestion was in fact definitely rejected by Patrick Manson 50 years ago; and there is little wonder that definite evidence for it is scanty seeing that, content to accept his considered opinion, almost no one has looked for any during this long period. But it is surely obvious that the case for the belief that periodicity is essentially due to the timing of parturition rests now far less on induction and far more on observation than was the case nearly four years ago when the hypothesis was dragged from its 50 years' sleep. Such observation is almost entirely the result of the planning and work of Dr. O'Connor and his staff, and is already throwing unexpected light on the pathological basis of the infection. Would not Manson, O'Connor's old friend and master, have delighted in them and their results?

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WUCHERERIA BANCROFTI INFECTION

TWO CASE REPORTS

BY F. W. O'CONNOR, M.R.C.S. ENG., D.T.M.
ASSOCIATE PROFESSOR IN THE COLUMBIA UNIVERSITY, NEW YORK
AND
C. R. HULSE

IN view of the renewed interest regarding the causation of microfilarial periodicity in *Wuchereria bancrofti* infection, the following cases are reported.

THE FIRST CASE

The patient, a male aged 39 years, a *native of* St. Croix, Virgin Islands, U.S.A., was in the care of Dr. James Knott, head of the department of health of that island, who kindly furnished the pathological material *for* study together with the following clinical notes: "Microfilariæ are present in the blood at night. Kahn test negative. Admitted to hospital for repair of right inguinal hernia and hydrocele, and showed no clinical signs of filariasis except slightly enlarged inguinal lymph nodes; femoral lymph nodes not enlarged; left testis appeared normal.

"*Operative Findings* (11.30 A.M.).—The hernia was repaired. The spermatic cord was opened, and the extravascular tissue carefully dissected away. The hernial sac, membranes of the cord, and the hydrocele sac were removed *in* one piece. The last was thin *and flaccid*, the fluid was clear and contained no cholesterin crystals and no microfilariæ. A piece of the gubernaculum (scrotal ligament), a right inguinal node, and a left inguinal node were removed."

The tissues, which had been fixed in 10 per cent. formalin, were serially sectioned in the usual way.

MACROSCOPIC EXAMINATION

The left inguinal lymph node was slightly larger than normal, but smaller than the right, which measured about 1½ in. by ½ in. The *periglandular tissue of the* right node was slightly increased. There was no noticeable thickening of the hydrocele sac, but some was present in the tissues removed from the spermatic cord.

MICROSCOPIC EXAMINATION

Left Inguinal Lymph Node.—The fibrous tissue of the capsule is slightly increased and *there is some increase* of the fibrous stroma. The afferent lymphatics are dilated and some are hypertrophied. No abnormality is observed in the *lymphoid tissue. No adult parasites* or microfilariæ are found.

Right Inguinal Lymph Node.—The periglandular tissue is considerably reinforced with fibrous tissue and fat, in which the blood-vessels are engorged and *their walls* hypertrophied, while the capsular lymphatics are dilated and hypertrophied, some of the cortical sinuses are dilated, there is *increase of fibrous tissue in various areas* of the medulla, much activity is observed in the cortical germ centres where pale areas containing developing lymphocytes are surrounded by zones of densely packed and *fully formed* lymphocytes, eosinophil cells are only occasionally seen and do not occur in groups, plasma cells are not observed. Numerous lymphocytes are distributed in the *hypertrophied capsule and in the* lymph sinuses.

There are no parent worms in the gland substance. In a dilated and *hypertrophied* lymphatic of the capsule *there is a recently* living male worm, but the endothelium of the vessel does not appear to be materially affected by its presence. At the opposite pole of the gland in a similarly affected *periglandular afferent* lymphatic there is a recently living female *W. bancrofti* in perfect condition. The posterior portions of the uteri contain ova in various stages of development, *their anterior* two-thirds are packed with microfilariæ which appear to be fully developed. The vagina is dilated in the posterior portion and is crammed with microfilariæ, the anterior portion *is not* dilated *but the lumen* is clearly demonstrable and contains sections of a few microfilariæ. In the lymphatic lumen, external to the worm, are a few microfilariæ, for the most part congregated *near the* vaginal orifice, but none are seen in the lymphatic beyond the limits of the parasite. Small aggregations of red blood-cells are present in both the lymphatic vessels which contain these parasites.

In the *afferent branches* and cortical sinuses of that portion of the lymph node which receives the vessel containing the female parasite, large numbers of microfilariæ and ova are present. While some of the *micro*filariæ appear to be healthy, the majority as well as the ova exhibit various stages of degeneration; many ova are collapsed and misshapen but are recognised by their size, shape, and nucleated contents, their degeneration seeming to be by fragmentation and absorption, with, in the earlier stages, irregularity in shape, ragged cuticle, and pale and ill-*defined nuclei. There is no* evidence of calcification of either microfilariæ or ova. A few ova and microfilariæ are present in the afferent branches and cortical sinuses around the *circumference of the gland;* a few microfilariæ but no ova are found in the sinuses occupying the depth of the gland, but towards the hilum and exit of the efferent vessels as well as in the efferent *vessels themselves no embryos* have been observed in spite of prolonged search; in the cortical germ centres individual microfilariæ are found apparently outside the sinuses or in-channels too small to be identified among the cortical cells; in none of the blood-vessels of the various sections studied are microfilariæ seen. In the capsule of the gland, but a considerable distance from the worms already described, is a partially calcified female parasite, in the non-calcified portions of which degenerated microfilariæ are seen; it is surrounded by a fibrous capsule.

THE SECOND CASE

During the general survey of filariasis in the village of Sweets, Antigua, B.W.I., which was organised by Dr. P. J. O'Mahony, the following case was discovered, and through the enthusiasm and influence of this officer these later studies were made possible. The patient, a schoolgirl aged 13 years, was born in Sweets.

Family History.—The mother of the patient has never suffered from filariasis. On examination she has definitely enlarged glands in the left epitrochlear and in both subinguinal regions. No microfilariæ have been found in her blood. The patient's brother, aged 3 years, has never suffered from filariasis, there is no adenopathy, and no microfilariæ have been found in the blood. A woman friend, many years resident in the same house, has suffered for several years from periodical attacks of lymphangitis of the right leg, during which pain is especially severe about the internal malleolus; on examination visible swellings are present in both epitrochlear regions, and a large one in the right groin, which slowly empties on continued pressure; no microfilariæ were found in the blood.

Past History.—She has never suffered from serious illness, has had occasional attacks of malaria, and complains of tiring easily. There is no history of filariasis. On March 10th, at 11.20 P.M., in 20 c.mm. of blood 1100 microfilariæ were found. Enlarged, hard, palpable glands were evident in both epitrochlear regions. In both subinguinal regions swellings were visible which, on palpation, suggested large, hard, lymphatic glands embedded in fat. The patient was quite certain that she had never experienced pain or discomfort in these regions. On March 15th, 1058 microfilariæ were present in 20 c.mm. of blood at 11.20 P.M. On March 30th at the same hour they numbered 936, and immediately after the blood specimen was taken Dr. O'Mahony injected 1½ c.cm. of typhoid (T.A.B.) vaccine subcutaneously into the right arm. On March 31st at 8 A.M. the temperature was 102°. She had had chills and complained of headache and a feeling of illness; her condition improved throughout the day. At 8 P.M. the temperature was 99°, and she was feeling better. At 11.20 P.M. 939 microfilariæ were found in 20 c.mm. of blood.

Considering the large numbers of microfilariæ in the blood, and in the hope of removing if possible some or all of the worms responsible for them and so preventing the onset of clinical filariasis at a future time, arrangements were made for her to be admitted for excision of the enlarged glands to the Holberton Hospital, St. Johns, Antigua, on April 3rd, 1933.

Condition on Admission.—The patient is a well-developed negress looking her age, there is no outward evidence of disease, examination of the head, chest, and abdomen reveals nothing abnormal.

Blood Examination.—Hæmoglobin (Sahli), 50 per cent.; total red blood-cells, 4,400,000; total white blood-cells, 13,760. Differential leucocyte count: polymorphonuclears 34, lymphocytes 54, and eosinophils 12 per cent. There were 1000 microfilariæ at 11.20 P.M. in 20 c.mm.

Stool Examination.—The specimen was brown and formed. Ova of *Trichuris trichiura* were present, as were also trichomonas and cysts of *Giardia hominis* and *Endolimax nana*.

Urine Examination.—Straw-coloured, reaction acid, specific gravity 1015; no sugar, no albumin, no microfilariæ or cells in the centrifuged sediment.

No evidence of filariasis was found other than the adenopathy and blood findings. On April 6th at 4 P.M. 54 microfilariæ were found in 20 c.mm. of blood.

Operations.—On April 7th Dr. A. Scott Gillett, superintendent and surgeon to the hospital, excised the right epitrochlear gland at exactly 11 A.M. After closing the wound the subinguinal glands on the right side were exposed and excised at 11.14 A.M. The time of these operations was decided upon in the belief that if female filariæ were present in the excised tissues the uteri of the parasites would contain microfilariæ, and parturition would not yet have taken place. Examination of the patient's blood at 11.20 P.M. on the same evening showed 1027 microfilariæ in 20 c.mm.

On April 13th the wounds on the right side having healed by primary union, similar operations were performed by Dr. Gillett on the left side in the epitrochlear and subinguinal regions. This time, hoping to find parturition in progress or completed, if female worms were present, the epitrochlear gland was excised at 12.22 P.M. and the subinguinal glands at 12.34 P.M. These wounds also subsequently healed by primary union. The blood was examined at 11.20 P.M. after this operation when 1610 microfilariæ were found in 20 c.mm. Other examinations of the patient's blood were made on April 18th and 26th, when 1517 and 630 respectively were found in the same quantity of blood at the same hour.

EXAMINATION OF GLANDS

Following the first operation the glands were placed in normal saline at body temperature and put into the incubator for a quarter of an hour. As no living wuchereria were observed emerging from the tissues, they were then placed in 10 per cent. formalin. A few microfilariæ were found in the saline after the tissues had been transferred.

Right Subinguinal Glands.—The periglandular structures are much increased by fat and fibrous tissue in which lie many dilated and hypertrophied lymphatic vessels. The blood-vessels are engorged and the walls of some are thickened. The largest node measured 1 in. by ½ in. The glandular tissue is not diminished and, as in all other glands removed from this patient, there is marked activity in the cortical germ centres; there is increase in the fibrous matrix of the medulla as well as between the cells of the cortex; many of the sinusoids are dilated especially in the cortical region; plasma cells are observable in places in the capsule and in the gland substance; eosinophil cells are not conspicuous except as a small group in the area of the capsule near the hilum, giant cells are not observed, active destruction of lymphocytes by reticular cells is seen in this as in all the other glands.

Parasites.—In the periglandular tissue in a dilated and hypertrophied lymphatic vessel containing many endothelial polypi are a recently living male and female *W. bancrofti*. The vagina of the female is collapsed anteriorly, but posteriorly it is dilated with sheaves of tightly packed microfilariæ. The anterior portions of the uterine tubes are also packed with microfilariæ which apparently are fully developed; behind these are ova containing embryos, while more posteriorly are developing embryos, granular ova, and, finally, non-granular ova. Within the lymphatic vessel containing these parasites no ova or embryos are seen except in a few sections where the parasites have been damaged by the microtome, nor are red blood-cells present. At the opposite pole of the gland a calcified female worm is visible, degenerated embryos are observed in the uterus, and the parasite is surrounded by a fibrous capsule. No microfilariæ are seen in the lymphatic vessel between the parent filariæ and the gland capsule; but in the lymphatic radicals and in the sinuses of the largest gland and an adjacent but smaller one they are numerous, some healthy in appearance, and some undergoing degeneration, this being recognised by irregularities in the cuticle and blurring and fragmentation of the nuclei, but there is no evidence of calcification of the embryos. A few healthy microfilariæ are present in the sections of blood-vessels of these glands, none in the efferent lymphatics. *No ova are present in this group of glands.*

Right and Left Epitrochlear Glands.—These glands were alike in every respect; they were slightly enlarged, with some dilated lymphatic vessels in the moderately thickened capsule and some increase in fibrous tissue in the gland substance. No embryos or ova are obvious except a few microfilariæ in the lumen of the blood-vessels.

Left Subinguinal Glands.—The tissue consists of two glands histologically similar. Round them fibrous tissue and fat are increased, the capsules are thickened, and there is some increase of the fibrous stroma; the lymphatics of the capsule are dilated as are some of the sinusoids, no adult worms are present, but in the cortical sinuses and between the cortical cells of one of the glands there are not only apparently healthy microfilariæ, but microfilariæ and ova undergoing degeneration. In the latter no embryos can be made out but nuclei and granules can be clearly seen, while frequently both embryos and ova are present in the same channels. In the other gland neither embryos nor ova are demonstrable except in some sections of the blood-vessels where a few embryos are seen.

SUMMARY

Excision of lymphatic glands was performed in two cases diagnosed as filarial, with a view to recovering adult filarial worms. This object was realised. Both operations were performed before midday but close to that time, and it was predicted as the result of previous observations that if living female *W. bancrofti* were present, parturition would not have taken place but would be imminent or just beginning. The prediction proved to be exactly correct in both cases. In the first case, in which the glands were excised at 11.30 A.M., microfilariæ were found in the vagina and, in very small numbers, in the lumen of the lymphatic close to the vulva. In the second case, while microfilariæ were also found in the vagina, no embryos had reached the exterior of the parent worm before operation.

In both cases microfilariæ apparently healthy, and microfilariæ and ova in various stages of degeneration, were found in the afferent radicals and cortical sinuses of lymphatic glands. In a separate group of glands from the second case healthy and degenerating microfilariæ *but no ova* were found in similar situations. These findings confirm O'Connor's previous observations that microfilariæ reaching a lymphatic gland along the lymphatic vessel containing the parent female may be destroyed in the gland. Apparently destruction of microfilariæ and ova in the glands may take place by disintegration and absorption as well as by calcification.

How ova in addition to microfilariæ may reach a lymphatic gland is not clear, but it seems possible that independent of abortion a few ova may pass to the exterior of the worm following the stream of microfilariæ through the vagina at the end of parturition. If the parent worm is at some distance from the gland it is conceivable that the nearly developed ova will have completed development in the lumen of the lymphatic and, having stretched the chorionic membrane, be transformed into completely developed microfilariæ by the time they reach the gland.

The numbers of microfilariæ circulating in the blood at night in Case 2 were not immediately diminished after operation, but were at first increased and later decreased. It is suggested in explanation that the initial increase in numbers may have been due to removal of gland filters where embryos had been destroyed, so that the parasites would reach the circulation in increasing numbers through the walls of the lymphatics, a possibility which has already been demonstrated (O'Connor). Subsequently, owing to obstruction of the lymphatic vessel by gland excision, stasis of lymph would probably occur followed by lymph thrombosis, occasioning death of the parent worm or worms. A diminution in the number of microfilariæ in the night blood would naturally ensue. The microfilariæ still found in the blood at night probably come from other filariæ beyond the scope of the two operations. In both cases microfilariæ and ova were found in the cortical sinuses and substance of lymphatic glands, where they were undergoing degeneration.

FURTHER OBSERVATIONS ON THE BIOCHEMISTRY OF ASTHMATIC CONDITIONS

WITH SPECIAL REFERENCE TO THE URINARY "PROTEOSE"

BY G. H. ORIEL, M.D. CAMB.[*]
ANDERSON DEMONSTRATOR OF CLINICAL CHEMISTRY,
GUY'S HOSPITAL

IN 1928 Barber and I gave [1] an account of researches into the biochemistry of allergic diseases. This was followed in 1930 by an account [2] of a nitrogenous substance, named "proteose," which was excreted in the urine during allergic paroxysms. Subsequently several reports have been published which show contradictory results, and an attempt will be made in this communication to correlate the findings and to give an account of work which has been done to overcome the difficulties of the various investigators.

It has become obvious that asthmatic subjects are divisible from a biochemical point of view into two main groups: (*a*) a true allergic group in whom skin tests to foreign proteins are positive, of which typical examples are pollen asthma and sensitisation to feathers and animal emanations; (*b*) a group in which no positive skin tests are demonstrable.

It has been previously pointed out that so-called proteose is present in normal urine.[1] The quantity varies from time to time in the asthmatic, but is greatly increased during the attack. This has been confirmed by Murray Lyon, Percival, and Stewart,[3] but the question remains whether the chemical properties vary also, or whether it is the same substance merely excreted in greater quantity.

DIFFERENCES BETWEEN NORMAL AND ASTHMATIC PROTEOSE

This problem has been approached in two ways. It is well known that asthmatic attacks cease, as a rule, while the patient is in hospital. This observation led Prof. Storm van Leeuwen to construct his "allergen-proof" chamber. Proteose has been prepared from patients whilst in hospital and free from attacks, and subsequently while at home when asthma was again present. The strength of the solutions used for testing was adjusted to approximately 10 mg. of nitrogen per 100 c.cm. in each case. The following is a typical example of the results obtained:—

CASE 1.—An unmarried woman, aged 25. Skin tests positive to milk, egg, and especially strong to dust extract. In addition to asthma, attacks of migraine occur. With the proteose made whilst in hospital, negative skin tests were found with a dilution containing 10 mg. per 100 c.cm. With the proteose prepared whilst at home, in the same strength, a reaction occurred, consisting of an erythematous area 2 in. in diameter, with a central weal with pseudopodia. In the strength of 1 mg. N per 100 c.cm. there was central wealing without pseudopodia, and an erythematous area of 1½ in. With a strength of 0·1 mg. N per 100 c.cm., an erythematous response of 1 in. with no wealing was obtained. The control saline was negative.

Another experiment was made, using patients who were sensitive to pollen only. Their proteose was made before and during the pollen season. It was found that, using the same strength of proteose for intradermal tests, the proteose made in the "off" season gave no response when tested with the tient, whereas that made during the hay-fever ason gave a marked reaction. For example :—

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[*] Working with the aid of a grant from the Medical Research Council, at the Asthma Clinic, Guy's Hospital.

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1. Colloidal material extracted from the urine of patients suffering from acute infectious conditions associated with β hæmolytic streptococci is capable, in a high proportion of cases, of producing a delayed erythematous reaction when injected intradermally into susceptible subjects.
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It will be seen therefore that in certain scarlet fever patients the urinary proteose may contain a specific substance—namely, the erythrogenic toxin (Okell) of the β hæmolytic streptococcus.

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Of 29 pollen-sensitive asthmatics, 25 (86 per cent.) gave a positive reaction to H.F.P. Five (17 per cent.) also gave a positive reaction to A.P. Of 41 non-pollen-sensitive asthmatics, 8, or 20 per cent., gave a positive reaction to H.F.P.; 31, or 76 per cent., gave a negative reaction to both solutions. Of 10 normal cases, none gave a positive test to either solution.

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One hundred cases in all were taken, and proteose prepared from each; 50 of the cases were normal persons and 50 were asthmatic. The proteoses were all prepared under my direction according to the technique described at the end of this article. The testing and reading of results were done by Dr. Bruce Pearson. He found that when each case was tested with his own proteose, of 50 normal men only 1 (2 per cent.) gave a significant reaction, even when tested with the strongest solution. Of 30 protein-sensitive asthmatics, 83 per cent. gave a positive reaction to their own proteose. Of 20 non-protein-sensitive asthmatics, only 15 per cent. gave a positive reaction.

He concluded that asthmatic proteose was relatively toxic, as 32 per cent. of the normal series gave positive reactions with asthmatic proteose, whereas only 4 per cent. of the normal series gave positive reactions to the proteose from other normal persons.

It is clear from the above results that asthmatic proteose differs from normal proteose.

CHEMICAL DIFFERENCES BETWEEN NORMAL AND ASTHMATIC PROTEOSE

An attempt was made to differentiate by chemical means between normal and asthmatic proteose. After numerous experiments a simple method was devised.

After the proteose had been washed as described in the appendix of this article, the precipitate was dissolved in the least possible quantity of N/10 NaOH. This solution was centrifuged to ensure its clarity. The solution was then made just acid with very dilute (1 per cent.) acetic acid. If a precipitate was obtained, it was centrifuged off. The resulting fluid was treated with a few drops of 30 per cent. trichloracetic acid, and the precipitate was centrifuged off. The supernatant fluid was then added to three times its volume of absolute alcohol and allowed to stand. Using this method it was found that in 10 normal cases none gave a precipitate with acetic acid, 9 gave a precipitate with trichloracetic acid, and none gave a precipitate with alcohol. On the other hand, in 40 cases of asthma a precipitate was obtained in 22 cases with acetic acid, in 38 cases with trichloracetic acid, and in 36 cases with alcohol, and three of the negative cases with alcohol gave no precipitate with acetic acid (Table I.). The asthmatic cases chosen for this experiment were all known to be sensitive to foreign proteins.

Table I

—	No. of cases.	Acetic precipitate.		Trichlor-acetic precipitate.		Alcohol precipitate.	
			Per cent.		Per cent.		Per cent.
Normal ..	10	0	0	9	90	0	0
Asthmatic ..	40	22	55	38	95	36	90

there is some increase of the fibrous stroma; the lymphatics of the capsule are dilated as are some of the sinusoids, no adult worms are present, but in the cortical sinuses and between the cortical cells of one of the glands there are not only apparently healthy microfilariæ, but microfilariæ and ova undergoing degeneration. In the latter no embryos can be made out but nuclei and granules can be clearly seen, while frequently both embryos and ova are present in the same channels. In the other gland neither embryos nor ova are demonstrable except in some sections of the blood-vessels where a few embryos are seen.

SUMMARY

Excision of lymphatic glands was performed in two cases diagnosed as filarial, with a view to recovering adult filarial worms. This object was realised. Both operations were performed before midday but close to that time, and it was predicted as the result of previous observations that if living female *W. bancrofti* were present, parturition would not have taken place but would be imminent or just beginning. The prediction proved to be exactly correct in both cases. In the first case, in which the glands were excised at 11.30 A.M., microfilariæ were found in the vagina and, in very small numbers, in the lumen of the lymphatic close to the vulva. In the second case, while microfilariæ were also found in the vagina, no embryos had reached the exterior of the parent worm before operation.

In both cases microfilariæ apparently healthy, and microfilariæ and ova in various stages of degeneration, were found in the afferent radicals and cortical sinuses of lymphatic glands. In a separate group of glands from the second case healthy and degenerating microfilariæ but no ova were found in similar situations. These findings confirm O'Connor's previous observations that microfilariæ reaching a lymphatic gland along the lymphatic vessel containing the parent female may be destroyed in the gland. Apparently destruction of microfilariæ and ova in the glands may take place by disintegration and absorption as well as by calcification.

How ova in addition to microfilariæ may reach a lymphatic gland is not clear, but it seems possible that independent of abortion a few ova may pass to the exterior of the worm following the stream of microfilariæ through the vagina at the end of parturition. If the parent worm is at some distance from the gland it is conceivable that the nearly developed ova will have completed development in the lumen of the lymphatic and, having stretched the chorionic membrane, be transformed into completely developed microfilariæ by the time they reach the gland.

The numbers of microfilariæ circulating in the blood at night in Case 2 were not immediately diminished after operation, but were at first increased and later decreased. It is suggested in explanation that the initial increase in numbers may have been due to removal of gland filters where embryos had been destroyed, so that the parasites would reach the circulation in increasing numbers through the walls of the lymphatics, a possibility which has already been demonstrated (O'Connor). Subsequently, owing to obstruction of the lymphatic vessel by gland excision, stasis of lymph would probably occur followed by lymph thrombosis, occasioning death of the parent worm or worms. A diminution in the number of microfilariæ in the night blood would naturally ensue. The microfilariæ still found in the blood at night probably come from other filariæ beyond the scope of the two operations. In both cases microfilariæ and ova were found in the cortical sinuses and substance of lymphatic glands, where they were undergoing degeneration.

FURTHER OBSERVATIONS ON THE BIOCHEMISTRY OF ASTHMATIC CONDITIONS

WITH SPECIAL REFERENCE TO THE URINARY "PROTEOSE"

By G. H. Oriel, M.D. Camb. *

ANDERSON DEMONSTRATOR OF CLINICAL CHEMISTRY, GUY'S HOSPITAL

In 1928 Barber and I gave [1] an account of researches into the biochemistry of allergic diseases. This was followed in 1930 by an account [2] of a nitrogenous substance, named "proteose," which was excreted in the urine during allergic paroxysms. Subsequently several reports have been published which show contradictory results, and an attempt will be made in this communication to correlate the findings and to give an account of work which has been done to overcome the difficulties of the various investigators.

It has become obvious that asthmatic subjects are divisible from a biochemical point of view into two main groups: (*a*) a true allergic group in whom skin tests to foreign proteins are positive, of which typical examples are pollen asthma and sensitisation to feathers and animal emanations; (*b*) a group in which no positive skin tests are demonstrable.

It has been previously pointed out that so-called proteose is present in normal urine.[1] The quantity varies from time to time in the asthmatic, but is greatly increased during the attack. This has been confirmed by Murray Lyon, Percival, and Stewart,[3] but the question remains whether the chemical properties vary also, or whether it is the same substance merely excreted in greater quantity.

DIFFERENCES BETWEEN NORMAL AND ASTHMATIC PROTEOSE

This problem has been approached in two ways. It is well known that asthmatic attacks cease, as a rule, while the patient is in hospital. This observation led Prof. Storm van Leeuwen to construct his "allergen-proof" chamber. Proteose has been prepared from patients whilst in hospital and free from attacks, and subsequently while at home when asthma was again present. The strength of the solutions used for testing was adjusted to approximately 10 mg. of nitrogen per 100 c.cm. in each case. The following is a typical example of the results obtained:—

CASE 1.—An unmarried woman, aged 25. Skin tests positive to milk, egg, and especially strong to dust extract. In addition to asthma, attacks of migraine occur. With the proteose made whilst in hospital, negative skin tests were found with a dilution containing 10 mg. per 100 c.cm. With the proteose prepared whilst at home, in the same strength, a reaction occurred, consisting of an erythematous area 2 in. in diameter, with a central weal with pseudopodia. In the strength of 1 mg. N per 100 c.cm. there was central wealing without pseudopodia, and an erythematous area of 1½ in. With a strength of 0·1 mg. N per 100 c.cm., an erythematous response of 1 in. with no wealing was obtained. The control saline was negative.

Another experiment was made, using patients who were sensitive to pollen only. Their proteose was made before and during the pollen season. It was found that, using the same strength of proteose for intradermal tests, the proteose made in the "off" season gave no response when tested with the

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patient, whereas that made during the hay-fever season gave a marked reaction. For example :—

CASE 2.—A married woman gave a negative response to her proteose made during May, 1932, in a dilution of 10 mg. per 100 c.cm. With the proteose made in June, 1932, after the commencement of hay-fever symptoms, she gave a strongly positive reaction consisting of wealing with pseudopodia and erythema to the 1 mg. N per 100 c.cm. solution, and even to the 0·1 mg. N per 100 c.cm. strength she gave an erythematous response.

From these experiments it is obvious that the reaction of the proteose does not depend merely on its nitrogen content. We originally stated : "A small quantity of the proteose can be recovered from the urine of a normal person in apparent health, but when this is scratched or injected into his skin, no local or general reaction results."[2]

Specificity.—This term has given rise to some misunderstanding. A positive skin test may be obtained by the intradermal injection of histamine in *all* subjects, and there is practically no difference between the asthmatic and the normal in this respect.[4] This is a non-specific reaction. On the other hand, in the case of a pollen-sensitive patient a histamine-like response is obtained with a dilute solution of a pollen which gives no reaction when tested on the normal person. This is a typical specific reaction. Again, a feather-sensitive asthmatic will give a positive skin test to an extract of feathers in a dilution which gives no response when tested on a non-feather subject. Frequently asthmatics are sensitive to more than one foreign protein ; for instance, many feather-sensitive asthmatics are also sensitive to animal emanations ; nevertheless, such multiple reactions are still considered specific.

Two types of reaction are recognised in skin-testing for allergy by the intradermal method : (1) a prompt response, which consists of erythema and wealing appearing and usually fading within half an hour of testing ; (2) a delayed reaction, occurring within 12 to 24 hours of the injection, which has no wealing but is indurated and erythematous. The former type is characteristic of sensitisation to proteins of non-bacterial origin (e.g., pollen, feathers, and fish) ; and the second type to proteins of bacterial origin (e.g., the tuberculin reaction and the Dick test). The question has been raised : Is there any evidence for the specificity of urinary proteose ? To take the question of bacterial allergy first, a paper by Conybeare[5] may be quoted. Working with material obtained by the proteose method from the urine of patients suffering from streptococcal illness, he came to the following conclusions :—

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—	No. of cases.	Acetic precipitate.		Trichlor-acetic precipitate.		Alcohol precipitate.	
			Per cent.		Per cent.		Per cent.
Normal ..	10	0	0	9	90	0	0
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The three fractions isolated *from a protein-sensitive* asthmatic during the attack, and the trichloracetic *acid fraction* of a proteose from a normal person, were severally tested on a series of protein-sensitive and non-protein-sensitive asthmatics. Of 23 protein-sensitive asthmatics 21 (91 per cent.) gave a positive reaction when tested with the acetic precipitate fraction. Of 17 similar asthmatics, 14 (82 per cent.) gave a positive reaction with the trichloracetic acid fraction. Of 23 cases tested with the alcohol fraction, 19 (83 per cent.) gave a positive reaction. In no case was a positive obtained with the "normal" trichloracetic acid fraction (Table II.).

TABLE II.—*Protein-sensitive Asthmatics tested with Fractions of Asthmatic Proteose*

—	Acetic fraction.	Trichloracetic fraction.		Alcoholic fraction.
		Normal.	Asthmatic.	
Number tested ..	23	22	17	23
Number positive ..	21	0	14	19
Percentage ..	91	0	82	83

TABLE III.—*Non-protein-sensitive Asthmatics tested with Fractions of Asthmatic Proteoses*

Number tested ..	12	12	12	12
Number positive ..	1	1	1	0
Percentage ..	8	8	8	0

In 12 non-protein-sensitive asthmatics the same tests were made, with the results shown in Table III.

It will be seen that the results are approximately the same as those which Bruce Pearson obtained with the whole proteose. It seems that, when the asthmatic proteose is fractionated, approximately the same results are obtained with each of the three fractions as when the whole proteose is used. It cannot be *claimed that any of these fractions* contains the whole of the reacting substance. This is explicable in view of the fact that when colloidal substances are precipitated they tend to carry down with them other colloids by adsorption. It should not, therefore, be surprising that it has been found impracticable to isolate the reacting substance in a pure state. There is, however, a definite difference in the precipitability of the fractions of the proteose in normal and asthmatic subjects, and two of the three fractions do not occur in normal persons. It is particularly interesting to note that *the trichloracetic acid fraction of the "normal"* proteose does not react with protein-sensitive asthmatics. This forms additional evidence that normal and asthmatic proteose are not the same substance.

It is almost certain that the so-called proteose is composed of the colloidal material excreted in the urine. separated by means of interfacial concentration of such material with finely divided ether globules in an acid medium. It probably contains a mixture of toxins, and various stages of the products of protein breakdown of the body. As before mentioned, the work of Conybeare has shown that a specific bacterial toxin may be demonstrated in this way. Other experiments which bear directly on this point have been published recently by Kerridge and Bayliss.[8] They found that in perfusion of the kidneys of cats, rabbits, and dogs, foreign proteins of low molecular weight—gelatin, egg albumin, Bence-Jones *protein*. and hæmoblogin—were excreted, whilst proteins of high molecular weight—albumin, globulin, and casein—were retained. These results contribute to an understanding of the problem of the proteose. It would indeed be more than surprising if broken-down proteins in the system were not excreted in the urine, provided they were of sufficiently low molecular weight.

THE NATURE OF THE REACTING SUBSTANCE

It appears from the Prausnitz-Kustner reaction that the portion of the protein which gives the positive skin test in susceptible subjects must be present in the circulation. It is improbable that any considerable quantity of whole protein is absorbed from the alimentary tract, for the natural processes of digestion split proteins high up in that tract. It was resolved to attempt to ascertain which *portion of the protein* molecule is the one giving the skin test in subjects *susceptible to egg*. Avery and Heidelberger [9] have shown that the specific portion of the pneumococcus is in the nature of a carbohydrate. I thought that the specific portion of egg-white might be of a similar nature. Rimington [10] had published a method of isolating the carbohydrate portion of serum albumin, and using his method I was able to isolate a similar substance from egg-white. This substance chemically is glucosamine dimannose, and it is certain that a pure substance was used for testing, as Messrs. Boots kindly prepared a further specimen which they examined pharmacologically and found free from histamine. This egg-carbohydrate was found to be quite inert when injected intradermally in both normal and egg-sensitive subjects in a dilution of 10 mg. per 100 c.cm. While making the carbohydrate it was noticed that the intermediate products of the alkaline hydrolysis of egg gave positive tests when tested on egg-sensitive subjects, using the scratch method. It was therefore determined to make intermediate *products of digestion, using trypsin for the purpose.*

The white of a new-laid egg was mixed with five times its volume of Evans's solution. A few c.cm. of trypsin were added (liquor trypsini co., A. and H.), and the whole covered with a layer of toluene and incubated for 36 hours. After incubation the digested mixture was boiled for five minutes after the addition of a few drops of acetic acid to coagulate the albumin, and filtered. The filtrate was again filtered through a bacterial filter. This filtrate gave a pink biuret reaction and an intense Mollisch reaction. Heated with dilute acetic acid it gave no precipitate.

The solution was neutralised and diluted to contain 10 mg. N. per 100 c.cm., and was tested intradermally on 10 normal subjects, all of whom gave a negative reaction. Six egg-sensitive patients similarly tested all gave positive responses. There is therefore evidence that the intermediate products of digestion can *retain the power of producing positive skin tests in* susceptible subjects even after boiling. It appears also that, *although the specificity of a protein probably* depends on its carbohydrate moiety, yet it is necessary *for a linkage of amino-acids to be present before a* positive skin test can be obtained.

This is not merely of academic interest, as might at first sight appear. Recent observations by Bruce Pearson and myself show that plasma which will not digest whole protein will digest peptone. This appears to be a natural mechanism for dealing with such protein breakdown products. Whether the asthmatic is deficient in this power, is the subject of our investigation, but the fact that protein cleavage products of a fairly simple nature can give specific responses, combined with the observation that plasma can digest such a product, should give us a *new line of approach to the asthma problem.*

APPLICATION TO TREATMENT

The results of treatment in asthma are notoriously difficult to assess. *Treatment with proteose has been* instituted by giving gradually increasing doses by subcutaneous injection. The *initial dose, given* is usually a very small one, 0·1 c.cm. of a dilution ten times weaker than the lowest dilution of autogenous urinary proteose which gives a positive skin test, and this is repeated at weekly intervals, increasing by 0·1 c.cm. at a time until either there is a reaction (e.g., increase in symptoms, malaise), or until the condition gives signs of improvement. In the series under consideration (Table IV.) the dose was not increased beyond that reached when improvement set in.

TABLE IV.—*Results of Treatment with Autogenous Urinary Proteose*

Type.	No.	Free.		Much improved.		Improved.		No change.	
			Per cent.		Per cent.		Per cent.		Per cent.
Protein-sensitive.	44	10	23	20	46	10	23	4	8
Non-protein-sensitive.	26	2	8	5	19	5	19	14	54

"Free" indicates that symptoms have been practically absent for six months; "much improved" is used in cases where the attacks are 75 per cent. less than before treatment was instituted; "improved" where the attacks are 50 per cent. less; and "unimproved" in cases in which either there is no change or when attacks are still within 50 per cent. of the number occurring before the beginning of treatment. No case is included unless treatment was commenced at least six months previously, but the majority of this group underwent treatment from one to two years.

It will be seen that the protein-sensitive asthmatic is much more likely to benefit from treatment with his urinary proteose than is the non-protein-sensitive asthmatic. Allowance must be made, however, for the age-incidence, for the protein-sensitive asthmatic tends to be younger than the non-protein-sensitive. According to these findings, a protein-sensitive asthmatic has a 70 per cent. chance of marked amelioration or complete relief, compared with the 27 per cent. chance of the non-protein-sensitive asthmatic. These results have been obtained without adjuvant treatment, for the investigation was made to ascertain the value, if any, of desensitisation by autogenous urinary proteose alone. Better results are to be expected if other methods are used in addition. For instance, if bacterial infection plays a part in the asthmatic condition, an autogenous vaccine can be combined with the urinary proteose. Elimination of feathers is of benefit in suitable cases, and so on, but the results now recorded were obtained without any such measures.

Darley and Whitehead[11] have reported similar results in hay-fever. They found that of 13 cases of hay-fever, all gave a positive intradermal test with their own proteose made during the hay-fever season. (They were working in America, and their cases were early hay-fever—i.e., sensitive to grasses.) Six cases were completely relieved (50 per cent.) and 6 were partially relieved (50 per cent.) One case was not treated.

DISCUSSION

The mechanism of desensitisation is still uncertain. Various substances, when injected into an asthmatic, may lead to amelioration of the condition, and it is difficult to see the common factor of the different substances used. Tuberculin, sulphur in oil, peptone, auto-hæmotherapy, auto-serotherapy, and some vaccines are examples of non-specific therapy, and the published results obtained by these measures appear to approximate to those obtained by specific means. Rackemann[12] has suggested that it is the production of a local area of "reaction" which is the important factor. He suggests that a third substance is liberated by local inflammation which is the cause of the beneficial effect. It is extremely unlikely that the various observers are all mistaken, and looking through their results one is surprised by the similarity of both the specific and the non-specific results, and the similarity of results in the different forms of non-specific therapy. It looks, from a statistical point of view, as though a common mechanism must underlie these procedures. If Rackemann's suggestion is well founded, and a third substance is formed by these measures, the third substance could possibly be of the nature of a foreign protein, and be excreted as such in the urine. Such a protein would be obtained from the urine by the method described, being included in the proteose.

It is interesting to note in this connexion that in those conditions in which an excess of proteose occurs in the urine, asthma is relieved. For instance, it is the rule rather than the exception for an asthmatic during pneumonia, or after an operation, or while suffering from a febrile or suppurative condition, or during pregnancy, to become free from symptoms. Is it not reasonable to suppose that in such conditions as auto-inoculation with autogenous tissue breakdown products occurs? It may well be that we are imitating this mechanism by the injection of urinary proteose, which presumably includes protein breakdown products, whether caused by the reaction of antigen on antibody in the tissues or by infection.

Summary and Conclusions

(1) The differences in biological activity of urinary proteose in different phases of the asthmatic state are described. (2) The meaning of the term "specific" is discussed. (3) The separation chemically of normal proteose into one fraction, and asthmatic proteose into three fractions is described, thus providing a method of distinguishing between the two preparations. (4) The results of the intradermal testing of each of such fractions on protein-sensitive and non-protein-sensitive asthmatics are given. (5) The absence of a positive skin reaction in egg-sensitive subjects when tested with the isolated carbohydrate of egg albumin is reported. (6) Positive reactions in such subjects with non-heat coagulable products of tryptic digestion of egg-white are described. (7) The results of treatment of 70 asthmatic patients with autogenous urinary proteose are given.

Appendix

It has been found advisable to modify slightly the method of preparing urinary proteose. The original method gave a product containing inorganic matter which tended to come out of solution after a time. The inorganic matter was found to be inactive as far as specific skin reactions were concerned, and was apt to cause non-specific reactions owing to variable isotonicity. This has been eliminated by centrifuging the alcoholic precipitate with distilled water. In order to keep the proteose solutions at a constant pH, Evans's solution is now used instead of phenol-saline. It has also been found that drying causes loss of solubility of the active part of the proteose; indeed, if allowed to stand for some time before being taken up into solution, the proteose is apt to become less soluble. It should again be emphasised that the specimens of urine used for the isolation must be taken during active symptoms. Urines which contain bacilli (e.g., *B. coli*) or have become alkaline from standing or from exposure should not be used, as proteose from such specimens is likely to give late reactions in all kinds of case. If these precautions are taken and the following technique followed, there should be no difficulty in preparing an active product in suitable cases.

Technique for the isolation of the nitrogenous substance from urine.—The patient is provided with two eight-ounce bottles containing chloroform, and is instructed to collect urine passed on the evening of the onset of symptoms and to place it in one bottle, and to put the next specimen passed (usually the morning specimen) in the other. These bottles are sent as soon as possible to the laboratory. The chloroform is added to obviate any possible bacterial decomposition owing to accidental contamination; 400 c.cm. of this urine is placed in a separating funnel and acidified with 25 per cent. H_2SO_4 until acid to congo red paper. The indicator is adsorbed to filter paper so that it is not dissolved in the urine. The acidified urine is then shaken vigorously with ether. The quantity of ether used is usually about a quarter of the volume of urine, but if the proportion of colloidal nitrogen is high, it may be necessary to use a larger proportion of ether. The fluids are then allowed to settle out; after the separation appears to be complete, the lower layer consisting of urine is run off. The upper layer will be found to separate out further into two layers if allowed to stand. The lower layer is again run off and discarded. Alcohol is now added to the ethereal layer until precipitation, which takes place, is complete. Usually a rather larger volume of alcohol than of ether is required to ensure complete precipitation of the nitrogenous substances. The resulting precipitate is then centrifuged and the supernatant alcohol and ether are poured off. The precipitate is then suspended in a small volume of distilled water.

If 400 c.cm. of urine has been used originally and all the precipitate has been collected in one centrifuge tube of approximately 15 c.cm. capacity, half the volume of the centrifuge tube of distilled water will be sufficient. After suspension, the tube is again centrifugalised. The pH of the supernatant fluid will be found to be still on the acid side, owing to sulphuric acid in the urine having been carried over. In acid solution a proportion of the original precipitate, which consists of inorganic matter such as calcium sulphate, is dissolved, whereas the nitrogenous material required is not soluble in acid solution. It will be found that the remaining precipitate is readily soluble when the pH is adjusted to 8·0 with sterile N/10 NaOH, and should be dissolved at once. This solution is then added to 9 c.cm. of Evans's solution.[13] Evans's solution is composed of—

Solution A.

KH_2PO_4	3·63 g.
$Na_2HPO_4 . 12 H_2O$.	14·31 g.
NaCl	50 g.
Water to 1000 c.cm.	

Solution B.

4 per cent. phenol.

A and B are mixed in equal parts. 200 c.cm. A and B mixture + 800 c.cm. water = Evans's solution pH 7·4

The result is designated 1/1000, as its average nitrogen content has been found to be of that order after estimation by Kjeldahl's method, but, as has been previously pointed out, the actual quantity of nitrogen present as extracted by this method is very little criterion as to the possible reaction on the part of the patient to injection of this substance.

One c.cm. of the 1/1000 solution is added to 9 c.cm. of Evans's solution, making a 1/10,000 solution, and similarly the 1/100,000 and the 1/1 million solutions are made. As a precautionary measure we are in the habit of plating out a few drops of the 1/1000 solution on suitable media and incubating at 37° C. to ensure that no accidental bacterial infection has occurred. As a matter of fact such contamination is very infrequent.

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ELECTROCARDIOGRAPHIC CHANGES IN TOXIC POLYNEURITIS

BY S. B. BOYD CAMPBELL, M.C., M.D., F.R.C.P. EDIN.
PHYSICIAN TO THE ROYAL VICTORIA HOSPITAL, BELFAST
AND
R. S. ALLISON, M.D. BELF., M.R.C.P. LOND.
ASSISTANT PHYSICIAN TO THE HOSPITAL

IT has long been understood that the heart may be affected in peripheral or polyneuritis. This is probably most true of the neuritis of diphtheria and beri-beri, but the occurrence of palpitation, tachycardia, and cardiac enlargement in other forms is also recognised. Earlier writers attributed these symptoms to a vagal neuritis, but this view is now rejected.[1 2] In beri-beri the cardiac changes have been studied very fully. There is enlargement of the whole heart and a tendency to œdema of the myocardium. No significant change in the electrocardiogram is reported,[1-3] though histological changes have been observed in the myocardium.[4] With the exception of beri-beri, however, the cardiac symptoms in polyneuritis are usually slight and do not attract attention. Recently we have met with a small group of eight cases in which the cardiac phenomena were more prominent than the neuritic symptoms. This unusual feature seemed to be of interest and suggested that the state of the myocardium should be investigated by electrocardiographic records. It is regretted that this was only done in three out of the eight cases, but the findings were interesting and attention is invited to them. As may be seen the characteristic change was an inversion of the T wave, and this was observed to return to normal as the patient recovered. A description is now given of the group of cases as a whole with details of three patients in whom cardiograms were taken.

The cases resembled each other closely in their insidious mode of onset and chief clinical features. The illness began in an indefinite manner, with such symptoms as pains in the limbs, palpitation, persisting vomiting, shortness of breath on exertion, and swelling of the feet and legs. At first sight some, not unnaturally, were thought to be unusual vasomotor disturbances, and their true nature not appreciated till later. This feature seemed to us to be unusual, but similar errors are recorded in the literature.[5] After these symptoms came sensory disturbances of numbness and tingling in the extremities with increasing weakness of the lower limbs. There was no history of sore-throat, and repeated swabs were negative for diphtheria. There was no urinary infection, and the blood and cerebro-spinal fluid gave a negative Wassermann reaction, the latter showing no increase of globulin or cells. Because of the absence of any obvious causal factor, the title of toxic polyneuritis[6] was applied to these cases.

On admission to hospital some still showed œdema of the legs below the knees, but though definite enough at first this was never great, and it disappeared rapidly with rest in bed. There was a symmetrical paresis of the lower limbs, with a tendency to foot-drop, and the tendon reflexes were abolished. Objective sensory disturbances were slight, and consisted of decreased sensibility to pin-prick over a stocking distribution, and frequently extreme tenderness of the calves of the legs to pressure. The face escaped and the upper limbs were little affected except for occasional weakness of the hand grips and of the extensor muscles of the forearms. No localised muscular wasting was seen at any time.

THREE CASES IN WHICH ELECTROCARDIOGRAPHIC RECORDS WERE TAKEN

CASE 1.—Male, aged 23. A plater by occupation, this patient was admitted to the Royal Victoria Hospital on Sept. 16th, 1932. He gave the following history: Five months previously he had noticed pains in the feet "as if a spike were being driven in." The pains were felt up the legs to the knees and particularly in the calves. Some time later he noticed pains across the abdomen, over the precordium, and in the wrists with shortness of breath on exertion. On examination he was of average nutrition and full-blooded. The skin perspired freely, particularly on the face, where the moisture stood out in drops on the forehead and upper lip. Dermatographia was present. Temperature was normal and pulse was 110–84. *Circulatory system.*—The apex-beat was in the fifth interspace, 4 in. from the midline, and a soft systolic murmur was heard at the mitral area but not conducted. Electrocardiogram taken on Sept. 19th showed the T wave rounded and inverted in leads II. and III. (Fig. 1). Respiratory and alimentary systems normal, also urinary system. *Nervous system.*—Cranial nerves normal. No muscular wasting or weakness. In the upper limbs the biceps and supinator jerks were absent. In the lower extremities the knee- and ankle-jerks were absent. Sensation to pinprick was decreased over the shins, and the calves were extremely sensitive to pressure. Rapid improvement followed rest in bed and full diet, with the result that on discharge from hospital on Oct. 20th, a month or so later, symptoms had disappeared. The electrocardiogram now showed no abnormality, save flattening of the T wave in lead III. (Fig. 2). Sensation was normal, but the tendon reflexes were still absent in the lower limbs.

FIGS. 1 2

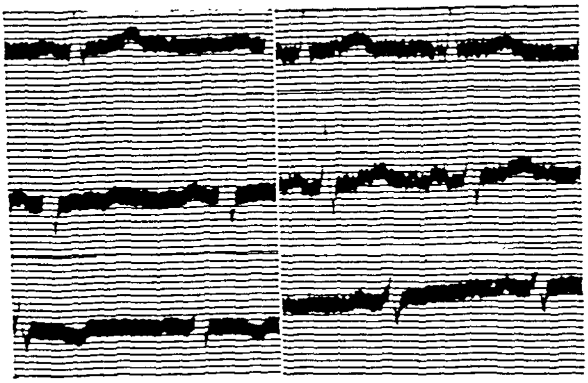

FIG. 1.—(Case 1) Sept. 19th, 1932. T wave rounded and inverted in leads II. and III.

FIG. 2.—Oct. 10th. T wave normal in lead II. and flat in lead III.

CASE 2.—Male, aged 19. Apprentice tailor. Admitted to the Royal Victoria Hospital on August 19th, 1932. He gave a history of swelling of both legs below the knees of two months' duration, dyspnœa on exertion, with inability to walk for past three weeks. On examination patient was somewhat pale and of average nutrition. There was slight œdema of the ankles extending up to the calves. The heart was not enlarged. There was a systolic murmur heard all over the precordium. Pulse was 112 and blood pressure 130/65. Electrocardiogram taken on August 22nd showed T wave rounded and inverted lead I. and diphasic lead II. (Fig. 3). T wave was flat lead III. Respiratory, alimentary, and urinary systems normal. *Nervous system.*—Cranial nerves normal. Weakness of dorsiflexors of ankles with shuffling gait, but no atrophy of muscle. Knee-jerks lost below the knees, more on the right side than on the left. Electrocardiogram taken on Sept. 10th showed the T wave flat lead I., but above the iso-electric line leads II. and III. (Fig. 4). Patient was discharged on Sept. 18th very much improved, cardiac symptoms being absent, the gait and sensation much improved. Examined seven months later on April 27th, 1933, he was found to be working and quite well, and his cardiogram normal.

CASE 3.—Female, aged 43. Admitted to the Royal Victoria Hospital on Sept. 14th, 1932. Three months before admission began to complain of numbness and tingling in the hands, extending from the wrists to the tips of the fingers. Later a tingling sensation in the legs was noticed. At this period there was a severe attack of vomiting. Weakness in the legs increased, and finally the patient was unable to walk without assistance. On examination there was slight sweating, but no cardiovascular physical signs except an alteration in the T wave of the electrocardiogram which was flat in lead I. and inverted leads II. and III. No free HCl was present in the gastric juice, but otherwise the alimentary, respiratory, and urinary systems were normal. *Nervous system.*—Cranial nerves normal; upper extremities also normal. Weakness of lower limbs with drop-foot, more marked on the right side. Diminished sensation to pinprick over legs, with loss of ankle- and knee-jerks. Patient was discharged on Oct. 20th, 1932, with a normal cardiogram, and with improvement in her neuritis, though for some months afterwards the drop-foot persisted with loss of tendon reflexes.

FIGS. 3 4

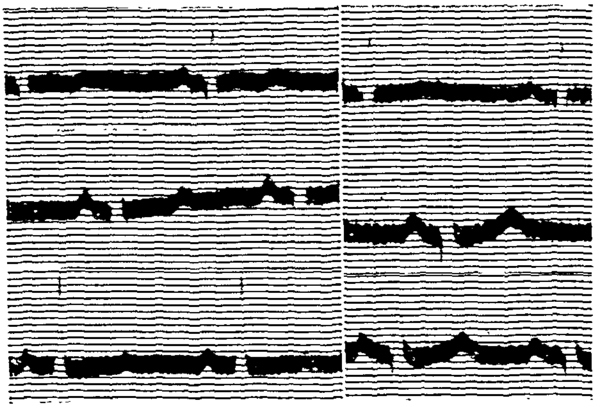

FIG. 3.—(Case 2) August 22nd, 1932. T wave rounded and inverted in lead I., diphasic in lead II., and flat in lead III.

FIG. 4.—Sept. 10th. T wave flat in lead I. and above the iso-electric line in leads II. and III. Further cardiogram taken on April 27th, 1933, shows T wave normal in all leads.

Published accounts of electrocardiographic records in the various forms of polyneuritis are rare. The type of polyneuritis in which cardiac changes occur most prominently is beri-beri. The cases described here bear some resemblance to the milder types of the disease as it is described in the East. Had these cases been seen in the Orient it is not improbable that they would have been attributed to that cause. On the other hand, it is open to question whether the varied diet of the European could ever become so deficient in vitamin B as to give rise to a polyneuritis with cardiac changes. In these cases the one conspicuous feature of the electrocardiogram was the inversion of the T wave. Although, of course, no specific claim or importance is attached to this, it indicates clearly, however, that the myocardium was affected, more so than is the case apparently in beri-beri. It seems probable, therefore, that these cases were more of infective than of deficiency origin. This conclusion is strengthened further by the occurrence of two of the cases in brothers, young boys who slept together in the same bedroom and formed part of a family of six. The remaining members of the family were not affected.

SUMMARY

A summary of eight cases of toxic polyneuritis is given with details of three in which electrocardiographic records were made. The cases presented a mild type of neuritis with pronounced cardiac symptoms and a tendency to œdema. The T wave in the electrocardiogram was inverted and returned to normal as the patients recovered. The ætiological factor was unknown, but it appeared probable that it was an infection rather than a deficiency.

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MENINGITIS DUE TO HÆMOPHILIC ORGANISMS

BY H. S. CARTER, M.D. LEEDS., D.P.H.
SENIOR ASSISTANT, PUBLIC HEALTH LABORATORY, CORPORATION OF GLASGOW

AND

CATHERINE M. MACLEOD, M.B. GLASG., D.P.H.
LATE RESIDENT MEDICAL OFFICER, RUCHILL FEVER HOSPITAL, GLASGOW

Dr. J. A. Braxton Hicks in 1927 described a case of meningitis due to a hæmophilic bacillus. The following are notes of three sporadic fatal cases of meningitis due to similar organisms which occurred recently in Glasgow.

CASE 1.—A male, aged nine months, was admitted to Ruchill Fever Hospital on Oct. 21st, 1932, with a history of pyrexia accompanied by vomiting and restlessness for four days. Before admission the child was pallid and semi-comatose and obviously acutely ill. Temp. 99·2° F., pulse 150, respirations 56. The pupils were dilated, equal, and reacted sluggishly to light. There was slight nuchal rigidity but no actual head retraction. The fontanelles were bulging and veins of the head prominent. Kernig's sign was positive. Abdominal reflexes absent. Heart and lungs: nothing abnormal found. Stools normal. 20 c.cm. of turbid cerebro-spinal fluid under increased pressure was withdrawn and 10 c.cm. antimeningococcal serum was injected intrathecally and 5 c.cm. intramuscularly. Next day the child's condition was worse. Twitching of the right arm was noticed. A further 15 c.cm. of now more turbid cerebro-spinal fluid was removed. Oct. 23rd saw further decline. There was no nuchal rigidity and no head retraction, but the pupils were unequal. Temperatures ranged from 102° to 103° F. More purulent cerebro-spinal fluid was removed, but the child died after six days' illness.

A modified post-mortem examination was allowed. The vertex of the brain was found to be covered with a thick, adherent layer of purulent material obliterating the sulci and convolutions and for the most part opaque, yellow, and solid in consistency, but gelatinous in appearance here and there. The frontal lobes were chiefly affected: the base of the brain was almost clear. In films of this exudate the Gram-negative organisms later to be described could be seen.

CASE 2.—Female, aged six months, was admitted to Stobhill Hospital on Nov. 19th, 1932, with a seven days' history of gastro-enteritis. As there were cerebral symptoms lumbar puncture was performed. A turbid cerebro-spinal fluid was obtained and the patient transferred to Ruchill Hospital the next day. On admission the child was thin, pale, and very ill. Temp. 101·2° F., pulse 164, respirations 56. There was some nuchal rigidity but no definite head retraction. The eyes appeared normal. Kernig's and Brudjinski's signs were positive. Abdominal reflexes were absent. Heart and lungs: nothing abnormal found. Stools green and fluid.

By lumbar puncture 20 c.cm. of turbid fluid under increased pressure was withdrawn and 20 c.cm. antimeningococcal serum was injected intrathecally and 10 c.cm. intramuscularly. On Nov. 21st the child was very restless and the "meningeal scream" was noted. Further lumbar punctures and cisternal puncture were performed and cerebro-spinal fluid of increased turbidity was obtained, until on the 28th thick pus was withdrawn. Treatment failed to modify the disease and death took place on Dec. 1st, the thirteenth day of observation.

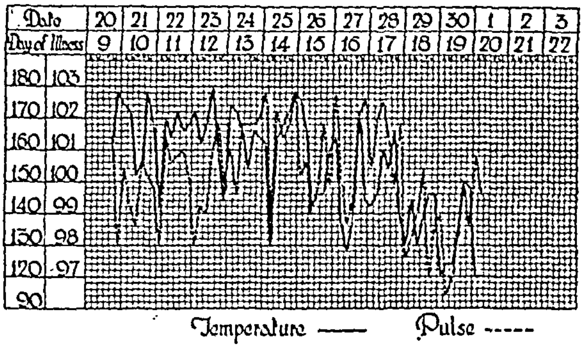

FIG. 1.—Temperature and pulse chart in Case 2.

CASE 3.—Female, aged 10 months. This child's illness began on Nov. 16th, 1932, with convulsions. She had had no previous infectious disease. On admission to Blawarthill Hospital on the 20th the temperature was 103° F., and the pulse- and respiration-rates increased. The child was pale and cyanosed. The eyes were deviated to the right. There was no nuchal rigidity. Kernig's sign was negative. Abdominal reflexes were not elicited. Heart, lungs, and abdomen: nothing abnormal found. Stools normal.

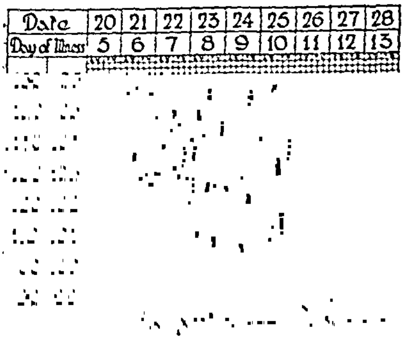

FIG. 2.—Chart in Case 3.

Lumbar puncture produced a turbid fluid under increased tension. On Nov. 21st head retraction and twitching of the limbs and trunk were observed. Quickly the child went downhill, becoming drowsy and refusing food. Further lumbar puncture revealed increased turbidity of the cerebro-spinal fluid which was still under increased pressure. Death occurred on the 26th, 10 days after the onset of illness.

BACTERIOLOGY

The samples of cerebro-spinal fluid from the above three cases received at the laboratory were all more or less similar in character, moderately turbid with light purulent deposits. Microscopically each contained large numbers of leucocytes, most of which were polymorphonuclear in type, and many pleomorphic Gram-negative bacilli.

Most of these organisms were between 2 and 8 microns in length, but there were a few cocco-bacillary forms and some long filamentous individuals. They were slender organisms 0·5 micron or less in breadth, some bent or curved, staining rather poorly with carbol-fuchsin, generally uniformly, but some presenting an irregular beaded appearance. In the fluids from Cases 1 and 3 many of the smaller forms were phagocytosed.

In each case visible growth was obtained in 16 hours on Fildes's agar. No growth was obtained on ordinary infusion agar, nor has it been possible after repeated trial to get growth of any one of these organisms on this medium. The organism from Case 1 grew very sparsely on coagulated sheep's blood-serum. All three grew well on chocolate agar and less well on unheated blood-agar. Colonies on Fildes's agar were slightly raised, smooth, entire, translucent, growing in 48 hours up to 2 mm. in diameter. In older cultures the centres of the colonies became darker and granular, and the borders remaining translucent tended to become irregular.

In the primary cultures the bacilli were more pleomorphic than those observed in the direct films from the cerebro-spinal fluids. They resembled morphologically Dible's Type "B" hæmophilic forms, or the larger and longer forms described by Henry. In the cultures from Case 2, tangled, wavy filaments were very numerous. Microscopically they were all three quite unlike the classic minute cocco-bacillary organism of Pfeiffer.

The organisms were easily cultivated in Fildes's broth and if cultures were kept at 37° C. the organisms remained viable for about three weeks. Exposed to diffuse daylight at room temperature they were usually dead in three days. In old cultures (two to three weeks) practically all evidence of pleomorphism was absent, and small, degenerate, unevenly staining forms only were to be seen. On subculture on liquid or solid media the pleomorphic characteristics were again in evidence.

The three organisms were non-motile, and non-hæmolytic on fresh rabbit blood-agar. Also no hæmolysis was observed when 48 hour fluid cultures (in Fildes's broth or McLeod's blood broth) were tested on 2 per cent. suspensions of human or rabbit's corpuscles. They also proved to be rapid indol-producers when grown on Fildes's broth, uninoculated controls being negative. Advantage was taken of Thjötta's medium (peptone water to which is added 20 per cent. of a boiled extract of *Bacillus proteus*) in which vigorous growths of the hæmophilic organisms were obtained, to test their fermentation reactions. In the presence of various added sugars, using Andrade's indicator, definite, though not very rapid or pronounced, changes were noted as below. Controls without sugars incubated in parallel showed no changes.

Organism.	Glucose.	Saccharose.	Mannite.	Galactose.	Lactose.	Lævulose.	Maltose.	Xylose.	Salicin.
Case I.	A	—	—	A	A	A	A	A	—
„ II.	A	—	—	A	A	A	—	A	—
„ III.	A	—	—	A	A	A	—	A	—

A = Acid. There was no gas formation.

It is stated by Kristensen (1922) and accepted by W. M. Scott that influenza bacilli do not ferment any sugars. The above results appear to differentiate the organisms under consideration. Using the same basic medium plus 0·2 per cent. nitrite-free potassium nitrate strong reduction of nitrate was demonstrable after 16 hours' growth.

Emulsions of these organisms grown on Fildes's agar were made and approximately 1500 millions of each (by opacity) were injected intraperitoneally into mice. The three mice were dead in nine hours. In each the peritoneum was injected and the spleen congested, enlarged, and soft. The organisms were recovered from the peritoneum and heart blood in each case. The organism from Case 2 was used to roughly ascertain the lethal dose. A mouse survived an intraperitoneal injection of 500 millions, though it was ill, drowsy, and with a staring coat for three days. Another mouse died in 24 hours after an injection of 750 millions given similarly. The organism was again recovered from the heart blood and peritoneum and also from the spleen which was enlarged and congested. The three organisms are seen to be pathogenic for mice, the killing power depending upon the size of the dose. A survey of recent literature on the subject reveals a variety of findings as to the pathogenicity of hæmophilic organisms for mice and other laboratory animals, but it appears to be generally held that the true Pfeiffer's bacilli associated with influenza are usually non-pathogenic and when they do kill toxæmia rather than septicæmia is the cause of death.

SUMMARY AND CONCLUSIONS

(1) Three fatal cases of meningitis due to so-called "hæmophilic" organisms have been described. (2) The organisms differ in several respects morphologically, culturally, and biologically from the classic cocco-bacillus of Pfeiffer, though some relationship probably exists. (3) The identity of Pfeiffer's bacillus with certain influenza-like organisms occurring in so-called influenzal meningitis, leptothrix meningitis, septicæmic cerebro-spinal meningitis, has been doubted by several writers—e.g., Cohen, Henry, Braxton Hicks, and Dible. The above notes supply some further grounds for this dubiety.

We express our thanks to Dr. W. R. Wiseman, city bacteriologist for Glasgow, at whose suggestion these notes were put together, for help and advice.

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Clinical and Laboratory Notes

A FATAL CASE OF ACUTE CAUSTIC SODA POISONING

BY STANLEY G. WILLIMOTT, PH.D. CAMB. AND LIVERP., B.SC.
GOVERNMENT ANALYST, CYPRUS

POISONING by caustic alkalis is comparatively rare in England, and cases in which this means has been chosen for self-destruction are fortunately still rarer. But it seems from the statement of Aezal,[1] of Budapest, that, during the ten years 1887–97, out of 1032 suicides no less than 415 were due to poisoning by caustic alkalis, and that death from this cause was formerly not uncommon in Hungary.

In England poisoning by caustic alkali has nearly always been the result of accident. Thus a man under treatment in hospital for a septic arm was given a dose of strong caustic soda in error.[2] Although the chief cause of death was considered to be due to the septic condition, which had been aggravated by the poison, severe burning of the internal organs was found at autopsy. A number of cases of poisoning by caustic soda or caustic potash and their effects are discussed in the well-known works of Taylor,[3] Glaister,[4] and Wynter Blyth,[5] so that little need be said here.

Sooner or later the majority of such patients die, and they appear to fall into two distinct groups: (a) those ending fatally within one or two days from the time of ingestion of the poison, and (b) those ending fatally some months or even years after. Patients who survive the primary effects of alkali poisoning usually succumb within six months from such after-effects as destruction of the lining membrane of the stomach or stricture of the œsophagus or pylorus. These conditions inevitably lead to death by starvation and exhaustion. Barclay[3] has described a fatal case of potash poisoning where it was found post mortem, inter alia, that a dense cicatrix was obstructing communication with the intestine except for a small orifice which admitted only the passage of a fine probe.

The present case was one in which a Turkish woman of Nicosia, aged 33, a mother of five children, committed suicide by taking a solution of caustic soda. She was employed as a day servant in a hairdresser's establishment. Caustic soda in small amount is used by the Turkish community in Cyprus for washing purposes, and the poison, which is freely available, was obtained in this way. Apparently no less than 60 g. (grs. 925) of solid caustic soda were dissolved in half a tumbler of water (about 120 c.cm.), and the entire solution was taken at 9.30 on the morning of Dec. 7th, 1932. The fatal dose of caustic soda is unknown, but in the case of caustic potash grs. 40 have proved fatal. In the present case the dose of caustic soda was 23 times as much.

Symptoms came on almost immediately, with vomiting and burning pains in the mouth, throat, and stomach. The woman fainted and on removal to hospital was pale, cold, clammy, and almost unconscious. There was great exhaustion and the pulse was almost imperceptible. There was constant vomiting but not purging, and later the patient complained continually of intense pain in the region of the stomach and abdomen, with great tenderness on application of local pressure.

On examination it was found that the buccal cavity, tonsils, and pharynx were soft and œdematous, and of the deep chocolate colour suggestive of burning by alkali, while the lips and tongue were red and swollen. The mouth gave a strong reaction to red litmus paper, and a cast of the roof of the mouth came away. The vomited matter was then investigated in the laboratory. This liquid was found to be of a brownish colour, due to the presence of blood, and contained portions of detached mucous membrane. It was unctuous to the touch, frothed somewhat on shaking, and exuded a peculiar odour. With litmus the vomit gave a strong alkaline reaction, which on analysis proved to be due to the presence of caustic soda. After filtering and washing free from alkali the filtrate was titrated against standard acid and found to contain 1·6 per cent. free caustic soda.

With this diagnosis the patient was at once given lemon juice ad lib., and later some milk in addition to the cardiac stimulants already prescribed. By the late afternoon there was a marked improvement which was continued until evening, and the patient was able to give a rational account of her actions which served to confirm the diagnosis made. The body temperature had increased to 97° F., the respiration-rate was 28, and the pulse-rate 100. By next morning, however, the condition of the patient had deteriorated and it was clear that a relapse had set in. Signs of necrosis were observed, and it was considered that perforation of the stomach had most probably occurred.

The patient was removed to her home against medical advice and death took place there about 3 P.M.—that is, 29½ hours after ingestion of the poison. At the inquest the coroner found a verdict of suicide by taking alkaline poison in the form of caustic soda. As the cause of death was clear and the patient had passed out of hospital, unfortunately no post-mortem examination was carried out.

My thanks are due to Dr. M. C. Coureas for some clinical details, and to Dr. G. C. Strathairn, director of health, for permission to publish this case.

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INTRALIGAMENTOUS RUPTURE OF THE FALLOPIAN TUBE

By D. M. Sutherland, M.D. Manch., F.R.C.S. Eng.

ASSISTANT SURGICAL OFFICER, MANCHESTER ROYAL INFIRMARY

INTRAPERITONEAL rupture of an ectopic gestation causing a pelvic hæmatocele is not uncommon; it was formerly considered that a pelvic hæmatocele was always due to tubal pregnancy, but it has since been shown that some of these cases are due to ruptured hæmorrhagic cysts of the ovary. Rupture of an ectopic gestation into the broad ligament is very rare. Usually there are recurrent attacks of pelvic pain due to repeated hæmorrhages; the patient becomes gradually anæmic, the pulse-rate and temperature rise, and with the formation of the hæmatocele there is fullness of one or both lateral fornices on pelvic examination. The clinical features of the following case are exceptional.

Three days after an attack of acute spasmodic asthma a woman, 47 years of age, was seized with severe pain in the lower part of the right lumbar region. During the next few days she had several similar attacks of less severity. During this time the pulse-rate was rapid, the blood pressure low, and the temperature slightly raised. Her condition then began to improve, but 16 days after the asthmatic attack she had an extremely severe attack of abdominal pain, associated with great collapse. The slightest movement of the abdomen was agonising. There had been no vomiting, no constipation, and the temperature was little over 99° F.

On examination of the abdomen it was found that a large oval tender swelling occupied the right iliac fossa; it did not seem to extend into the pelvis, and resembled identically the swelling caused by an appendix abscess due to a retrocæcal appendicitis. The swelling was explored through an oblique muscle-splitting incision and an extraperitoneal collection of old blood clot mixed with bright red blood was found. The origin of the hæmorrhage was obscure; it was not coming from the kidney. The abdomen was opened through a right paramedian incision, but it was not until the patient was placed in the Trendelenburg position that the source was found. The right broad ligament showed a purplish area, due to rupture of the uterine end of the Fallopian tube. There did not appear to be any considerable effusion of blood into the pelvic cellular tissues. The uterus was enlarged.

The tube and ovary were removed, the hæmatoma in the right iliac fossa evacuated and drained for four days. Some vaginal hæmorrhage appeared several days after the operation, but this soon ceased and convalescence was uninterrupted.

It is difficult to account for the direction of the extravasation of blood in this case. The diagnosis was clouded by the situation of the hæmatoma, the absence of any pelvic swelling, and the woman's age, although the menstrual periods had been very regular.

BRITISH MEDICAL ASSOCIATION

ANNUAL MEETING IN DUBLIN

SECTION OF MEDICINE

Prof. **Henry F. Moore** (Dublin) being in the chair, Sir **Humphry Rolleston** opened a discussion on

Essential Vascular Hypertension

He defined essential vascular hypertension as a term used to describe persistent high blood pressure not obviously secondary to renal or other disease. The condition might, however, be the antecedent of cardiovascular changes, renal fibrosis with an arteriolar thickening, and their various results. High blood pressure had been said to be a compensatory adaptation to maintain an efficient circulation through the kidneys, brain, and myocardium, but Reid's observations did not support this view as regards renal function. Starling had suggested arteriolar proliferation in the vasomotor centre and Bordley and Baker arterio-sclerosis in the medulla oblongata, as causes of hypertension, but these theories had not been confirmed. MacWilliam had concluded that the hypertensive impulse, however caused, emanated from the controlling vasomotor centre in the medulla. Experimentally Kroetz had contested the theory of hypersensitivity of the vasomotor centre. Vasomotor instability was present in many cases and suggested that a metabolic poison selectively constricted the arterioles of the centre, stimulating pressor impulses. That peripheral obstruction causing high pressure was due to spasm rather than structural narrowing was proved by Broadbent's observation on the fall of pressure produced by amyl nitrite. High blood pressure and arterio-sclerosis could occur independently. He thought that in essential hypertension the site of peripheral obstruction might be in the arterioles or the capillaries or in both. He stated that essential hypertension had been divided into benign and malignant forms, but he considered that the malignant forms were not included under this heading. With regard to the ætiology he pointed out that hypertension was a reaction and it was unnecessary to obey the law that there is "but one cause for one effect." Heredity was a disposing factor as proved by the work of Weitz, George Draper, and Major.

He then considered endocrine disorders. Excessive secretion of adrenaline, either from hyperplasia of the cortex or, as later suggested by Vaquez, from overactivity of the chromaffin system, or by Paul and Goldzieher from hyperplasia of the adrenal medulla, was not proved to be a cause of hypertension, as the presence of adrenaline in the blood of hypertensive subjects had not been established. He pointed out also that primary adrenal tumours were not necessarily associated with hypertension; with neuroblastomas of the medulla the blood pressure was low, with cortical tumours the blood pressure was sometimes low, and at other times persistently high; primary tumours of mature chromaffin cells (phæo-chromocytomas when arising from the medulla and paragangliomas when derived from chromaffin cells elsewhere) might be associated with paroxysmal hypertension, a condition distinct from essential hypertension. He agreed with MacWilliam that deficiency of hypotensive bodies might cause hypertension, such substances as histamine, choline, acetyl-choline, and adenosine or unidentified extracts from liver and brain. He specially referred to vagotonine, recently isolated from the pancreas by Santenoise, as this caused a slowly progressive prolonged hypotensive effect never followed by a hypertensive reaction. That the absence of vagotonine might account for hypertension was supported by the fact that in its presence the sugar tolerance was low and the tonus of the sympathetic nervous system was increased and that of the parasympathetic diminished, as compared with the normal subject. Abrams, Santenoise, and Bernal had treated 80 hypertensive patients with vagotonine; 30 were permanently better, though a number did not respond. Attempts had been made to isolate pressor substances other than adrenaline. Major had noted an increase of a substance in the blood with reactions resembling those of guanidine in 50 per cent. of hypertensive subjects, a fall of blood pressure followed increased excretion through diuresis. Psychical influences as a cause of hypertension had been considered but, he said, as a single efficient cause their claim must not be rated too high.

The clinical significance of essential hypertension was that it was the potential antecedent of cardiovascular and renal complications.

Dr. **John Gray** (Aberdeen) spoke from the pathological aspect. A relationship between arteriolar changes and primary hypertension was accepted but the relationship between hypertension and chronic degenerative changes in the arteries was disputed. Hypertension was associated with hyaline or fatty thickening and narrowing of the arterioles, but there were a surprising number of healthy glomeruli and tubules. The histological changes in arterioles, other than the renal, were not constant; they were frequent in the spleen, but similar changes occurred in the absence of hypertension. Probably where there was considerable renal contraction, ischæmia from progressive arteriolar changes did itself produce widespread changes, and renal insufficiency was thus produced by primary hypertension without any toxic nephritis being superadded. The nephritic kidney showed an atrophy of glomeruli and tubules out of proportion to vascular changes, while in primary hypertension the arteriolar changes were more marked, though the dividing line might be ill-defined. Exceptionally hypertension occurred without renal arteriolar changes, suggesting that the changes are the result not the cause of hypertension and justifying the term primary.

Prof. **W. W. D. Thomson** (Belfast) discussing the renal aspect said that it was secondary to the cardiovascular significance. Hypertension led to a characteristic subendothelial hyaline thickening of the intimal coat of the arterioles almost constantly present in the vasa afferentia of the kidney and sometimes in the arterioles of the retina, spleen, pancreas, liver, and brain; and to hypertrophy of the heart. The differential diagnosis from nephritis was important as an error subjected the non-nephritic patient to much useless restriction, but in later stages, when renal damage was superadded, the differential diagnosis might be impossible. In essential hypertension the specific gravity of the urine, under suitable conditions, varied from 1002 to 1025; in nephritis it was fixed at a lower level. Essential hypertension was the commoner disease, the familial history of cardiorenal vascular disease occurred later in life, the cardiovascular symptoms were more obtrusive, the average systolic blood pressure higher and might fluctuate more, there was no œdema (unless cardiac) and no anæmia.

Dr. **F. C. Purser** (Dublin) discussed hypertension from the cerebral aspect. He agreed that symptoms attributable to involvement of the nervous system are discussed in the well-known works of Taylor,[3] Glaister,[4] and Wynter Blyth,[5] so that little need be said here.

Sooner or later the majority of such patients die, and they appear to fall into two distinct groups: (*a*) those ending fatally within one or two days from the time of ingestion of the poison, and (*b*) those ending fatally some months or even years after. Patients who survive the primary effects of alkali poisoning usually succumb within six months from such after-effects as destruction of the lining membrane of the stomach or stricture of the œsophagus or pylorus. These conditions inevitably lead to death by starvation and exhaustion. Barclay[3] has described a fatal case of potash poisoning where it was found post mortem, inter alia, that a dense cicatrix was obstructing communication with the intestine except for a small orifice which admitted only the passage of a fine probe.

The present case was one in which a Turkish woman of Nicosia, aged 33, a mother of five children, committed suicide by taking a solution of caustic soda. She was employed as a day servant in a hairdresser's establishment. Caustic soda in small amount is used by the Turkish community in Cyprus for washing purposes, and the poison, which is freely available, was obtained in this way. Apparently no less than 60 g. (grs. 925) of solid caustic soda were dissolved in half a tumbler of water (about 120 c.cm.), and the entire solution was taken at 9.30 on the morning of Dec. 7th, 1932. The fatal dose of caustic soda is unknown, but in the case of caustic potash grs. 40 have proved fatal. In the present case the dose of caustic soda was 23 times as much.

Symptoms came on almost immediately, with vomiting and burning pains in the mouth, throat, and stomach. The woman fainted and on removal to hospital was pale, cold, clammy, and almost unconscious. There was great exhaustion and the pulse was almost imperceptible. There was constant vomiting but not purging, and later the patient complained continually of intense pain in the region of the stomach and abdomen, with great tenderness on application of local pressure.

On examination it was found that the buccal cavity, tonsils, and pharynx were soft and œdematous, and of the deep chocolate colour suggestive of burning by alkali, while the lips and tongue were red and swollen. The mouth gave a strong reaction to red litmus paper, and a cast of the roof of the mouth came away. The vomited matter was then investigated in the laboratory. This liquid was found to be of a brownish colour, due to the presence of blood, and contained portions of detached mucous membrane. It was unctuous to the touch, frothed somewhat on shaking, and exuded a peculiar odour. With litmus the vomit gave a strong alkaline reaction, which on analysis proved to be due to the presence of caustic soda. After filtering and washing free from alkali the filtrate was titrated against standard acid and found to contain 1·6 per cent. free caustic soda.

With this diagnosis the patient was at once given lemon juice ad lib., and later some milk in addition to the cardiac stimulants already prescribed. By the late afternoon there was a marked improvement which was continued until evening, and the patient was able to give a rational account of her actions which served to confirm the diagnosis made. The body temperature had increased to 97° F., the respiration-rate was 28, and the pulse-rate 100. By next morning, however, the condition of the patient had deteriorated and it was clear that a relapse had set in. Signs of necrosis were observed, and it was considered that perforation of the stomach had most probably occurred.

The patient was removed to her home against medical advice and death took place there about 3 P.M.—that is, 29½ hours after ingestion of the poison. At the inquest the coroner found a verdict of suicide by taking alkaline poison in the form of caustic soda. As the cause of death was clear and the patient had passed out of hospital, unfortunately no post-mortem examination was carried out.

My thanks are due to Dr. M. C. Coureas for some clinical details, and to Dr. G. C. Strathairn, director of health, for permission to publish this case.

REFERENCES

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were very common, but doubted if all, or any of them, were due to the hypertension. In those cases where arterio-sclerosis existed, the symptoms might be as plausibly put down to the vascular degeneration as to the hypertension. Symptoms attributable to the nervous system were (1) giddiness, (2) headache, (3) insomnia, (4) pains and paræsthesiæ. Focal lesions in the brain seemed to be explicable by local anæmia of the cortex due to angiospasm. He mentioned, among these paralyses, hemiplegias lasting a few hours to a few days. Later when arterial degeneration had supervened, cerebral hæmorrhage was a frequent terminal event. Convulsive seizures were fairly common, especially when alcoholism was present. Dementia might supervene, but the patient rarely became the vegetative creature found in dementia due to other causes.

Dr. M. A. CASSIDY (London) discussed the cardiovascular aspect and prognosis. If the family history did not point to early cardiovascular degeneration, the personal history was good, and the physical examination negative in a hypertensive subject, the prognosis was greatly improved. Albuminuria, per se, was not so important as it was considered to be. A night urine of low specific gravity, and one which remained fixed at about 1010, after drinking a pint of water, was more ominous. The diastolic reading was far more important than the systolic which often fluctuated, but even so high a diastolic pressure as 110 did not necessarily indicate organic hypertension. Severe symptoms might be associated with benign hypertension. Paroxysmal nocturnal dyspnœa, hypertensive retinopathy, congestive failure, and a high blood-urea were ominous. He deplored the tendency of the laity and the medical profession to take essential hypertension too seriously and to foster a blood-pressure obsession.

Prof. T. W. T. DILLON (Dublin) contributed a paper on renal function tests in the differential diagnosis of essential vascular hypertension. Indirectly, he said, and by means of its action on the blood, the kidney controlled the ionic composition of the interstitial fluids. He described the tests of Addis, van Slyke, and Conway, and summed up by stating that remarkable advances had been made in recent years, and a quantitative test of great precision had been evolved. There was no satisfactory test of salt and water excretion, though recent physiological experiments would appear to have provided the necessary basis.

Prof. JOHN HAY (Liverpool) discussed treatment. The first duty of the physician was, he said, to determine the presence of associated definite arterio-sclerosis. The discovery of high blood pressure carried with it two dangers: (1) excessive zeal in its attempted reduction to what the practitioner considered normal; (2) the patient's blood-pressure obsession. He believed there was an optimum pressure at which each individual functioned best. He pinned his faith on general measures rather than drugs. If symptoms and signs were marked, he advised putting the patient to bed in a sympathetic environment giving mild sedatives; investigations could then be completed and the necessity for modifications of the patient's mode of life determined. Sources of infection, though not a cause of hyperpiesia, should be eliminated. Congenial and non-competitive exercise was beneficial; sufficiency of
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SECTION OF SURGER

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ogressive jaundice, however, it was unwise to lay operation, as hepatic insufficiency was increas-g. It was seldom necessary to operate during the :ute stage of cholecystitis. Hepatitis, œdema of ie base of the right lung, and an increased tendency bleed increased the dangers of the operation. ut if after 48 hours there was not evidence of the flammation subsiding, it was better to operate ithout further delay, as, particularly in patients ver 60, there was a definite chance that gangrene f the gall-bladder was occurring. In many cases *. welchii* was the infecting organism.

Cholecystectomy was the operation of choice, and he best anæsthetic was gas-and-oxygen, supplemented by ether and combined with local anæsthesia f the abdominal wall. The oblique subcostal incision vas the most generally useful. The common duct hould always be drained after removal of a stone rom its lumen, and the gall-bladder should be emoved. In emergency operations for acute empyema of the gall-bladder, simple drainage was as a rule the only justifiable procedure. There was a type of case met with in whom the clinical history and the failure of the dye test to demonstrate a gall-bladder both pointed strongly to a gall-bladder lesion, and yet in whom operation revealed a distended gall-bladder without apparent cause. In Prof. Wilkie's opinion the only course to adopt was to remove the gall-bladder. In several instances the result had been to cure the symptoms.

Prof. H. L. BARNIVILLE (Dublin) said that statistics went to show that the rate of incidence of gall-bladder disease was pretty well stationary. There was considerable difficulty in determining the route of entry of infection to the gall-bladder. It might be by the portal venous system or it might be by the arteries, but it certainly was not along the common duct. He agreed that the streptococcus was most frequently the causal organism, and he also had found that the gall-bladder acted at times as a focus of general infection, such as was found in fibrositis. He had even known a case of auricular fibrillation complicating gall-bladder disease to clear up and remain well for 12 years after cholecystectomy. Secondary anæmia was also sometimes curable by drainage of the gall-bladder. The ill-behaviour of the base of the right lung was a serious post-operative complication. The patient after gall-bladder operations should be taught to breathe well and to move about in bed. The abdominal binder should be dispensed with. Once established the condition was very difficult to treat.

Mr. G. H. EDINGTON (Glasgow) presented an analysis of 200 cases of biliary disease: 172 in females, 28 in males. In [illegible] cases calculi were found, an
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Mr. A. J. WALTON
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Dr. COLLIS, in describing the mode of primary infection in pulmonary tuberculosis, said that a droplet containing tubercle bacilli was inhaled and caught in the lung parenchyma: after two to eight weeks without symptoms or signs hypersensitivity to tuberculin appeared, together with certain general symptoms, such as pyrexia, anorexia, loss of weight, erythema nodosum, phlyctenular conjunctivitis, and early pleurisy, while X rays showed focal lung reactions and enlarged hilus glands. The sedimentation-rate of red cells rose markedly. The majority were very common, but doubted if all, or any of them, were due to the hypertension. In those cases where arterio-sclerosis existed, the symptoms might be as plausibly put down to the vascular degeneration as to the hypertension. Symptoms attributable to the nervous system were (1) giddiness, (2) headache, (3) insomnia, (4) pains and paræsthesiæ. Focal lesions in the brain seemed to be explicable by local anæmia of the cortex due to angiospasm. He mentioned, among these paralyses, hemiplegias lasting a few hours to a few days. Later, when arterial degeneration had supervened, cerebral hæmorrhage was a frequent terminal event. Convulsive seizures were fairly common, especially when alcoholism was present. Dementia might supervene, but the patient rarely became the vegetative creature found in dementia due to other causes.

Dr. M. A. CASSIDY (London) discussed the cardiovascular aspect and prognosis. If the family history did not point to early cardiovascular degeneration, the personal history was good, and the physical examination negative in a hypertensive subject, the prognosis was greatly improved. Albuminuria, per se, was not so important as it was considered to be. A night urine of low specific gravity, and one which remained fixed at about 1010, after drinking a pint of water, was more ominous. The diastolic reading was far more important than the systolic which often fluctuated, but even so high a diastolic pressure as 110 did not necessarily indicate organic hypertension. Severe symptoms might be associated with benign hypertension. Paroxysmal nocturnal dyspnœa, hypertensive retinopathy, congestive failure, and a high blood-urea were ominous. He deplored the tendency of the laity and the medical profession to take essential hypertension too seriously and to foster a blood-pressure obsession.

Prof. T. W. T. DILLON (Dublin) contributed a paper on renal function tests in the differential diagnosis of essential vascular hypertension. Indirectly, he said, and by means of its action on the blood, the kidney controlled the ionic composition of the interstitial fluids. He described the tests of Addis, van Slyke, and Conway, and summed up by stating that remarkable advances had been made in recent years, and a quantitative test of great precision had been evolved. There was no satisfactory test of salt and water excretion, though recent physiological experiments would appear to have provided the necessary basis.

Prof. JOHN HAY (Liverpool) discussed treatment. The first duty of the physician was, he said, to determine the presence of associated definite arteriosclerosis. The discovery of high blood pressure carried with it two dangers: (1) excessive zeal in its attempted reduction to what the practitioner considered normal; (2) the patient's blood-pressure obsession. He believed there was an optimum pressure at which each individual functioned best. He pinned his faith on general measures rather than drugs. If symptoms and signs were marked, he advised putting the patient to bed in a sympathetic environment giving mild sedatives; investigations could then be completed and the necessity for modifications of the patient's mode of life determined. Sources of infection, though not a cause of hyperpiesia, should be eliminated. Congenial and non-competitive exercise was beneficial; sufficiency of sleep was essential. Weight should be reduced if above the average; complicated diets were not necessary, but alcohol, tobacco, tea, and coffee should be taken in strict moderation. He discussed venesection, diathermy, and spa treatment.

SECTION OF SURGERY

AT the second meeting of this section, Prof. C. J. MACAULEY being in the chair, Prof. D. P. D. WILKIE (Edinburgh) opened a discussion on

Surgical Diseases of the Biliary Tract

His remarks fell under the following headings—significance of biliary disease, indications for surgical interference, results of such interference. With the changing incidence of various diseases there had, he *said, been little if any change in the incidence of* diseases of the bile tracts. Gall-stones probably occurred in 5–10 per cent. of the population, and in the majority of cases they caused symptoms. They were, in his opinion, the commonest cause of dyspepsia. Although gall-stones could occur without pre-existing infection, sooner or later infection was superimposed, and there was considerable evidence to suggest that this infection was usually intramural in site, the streptococcus being the commonest infecting organism, with the *B. coli* and the *B. welchii* next in importance. In addition to the significance to the patient of the local pathology, there were two other aspects of gall-bladder disease to be considered—viz., the complications to which they gave rise and the grave interference with general health which might ensue. As direct complications, Prof. Wilkie mentioned local spread of infection, empyema of the gall-bladder, stone in the common duct, with its resultant train of symptoms, and carcinoma of the gall-bladder. Pancreatitis and hepatic cirrhosis were results of long-standing disease, whilst the heart, kidneys, and the joints and muscles all tended to show the toxic effects of biliary infection. It was not unusual for a patient after removal of the gall-bladder to be more impressed with the loss of his rheumatism than with the cure of his biliary symptoms. Carcinoma of the gall-bladder he had found *31 times in a total of 987 operations on the biliary* tract; it was commoner than was supposed.

The indications for operation in a case of biliary disease were: (1) to relieve local symptoms, such as biliary colic, dyspepsia, or cholecystitis; (2) to combat distant toxic effects; and (3) *to anticipate the onset* of malignancy. In all the cases of carcinoma on which he had operated gall-stones were present, and all but five were inoperable. In the diagnosis of gall-stones a great deal of reliance was to be put on the purely clinical investigation. Mistakes were just as common when the diagnosis was based on the results of special methods, such as secretion of dyes. The dyspepsia of gall-stone origin was distinguished, amongst other points, by an inability to digest cooked fats, and by an ache below the right shoulder-blade. The dyspepsia might or might not be punctuated with attacks of biliary colic. Even *stone in the common bile-duct could occur without* biliary colic; vague dyspepsia, loss of weight, and mild jaundice might be the only symptoms. Delay in operating in the case of stone in the common duct invariably led to serious damage to the pancreas and liver. Nowadays many women sent to the surgeon as cases of gall-stones proved to be suffering from duodenal ulcer. A diagnosis of cholecystitis had been made in over 10 per cent. of cases proving on investigation to be duodenal ulcer. Prof. Wilkie laid great stress on the importance of thorough "training for operation" in the obese type of patient with gall-stones. It was his practice to insist that they should lose 2½ st. in weight before he would agree to operate. This might entail a three-months' course of diet and outdoor exercise. In patients with of iron was administered. In most cases a reticulocytic response and eventually recovery occurred. Sometimes recovery was incomplete and another dietetic factor such as copper or yeast had to be added. Discussing how the anæmia arose Dr. Parsons quoted experiments which favoured the theory that there was some defect in the fœtal storage of iron, and therefore probably also of such other factors as thyroxine and vitamin C. An iron deficiency might result from inadequate antenatal storage or deficient postnatal supply, or both factors might act together. Prematurity, multiple pregnancies, and an inadequate maternal diet during pregnancy were other factors of importance. It was certain that some babies required more iron than others, either from a difference of "constitution" or as a result of illness.

Some babies were undoubtedly cured more quickly than others; the variation might possibly be due to intercurrent infection or differences in the preparation of iron used. The divalent form had given the best results, and ferrous sulphate, to which glucose had been added to prevent oxidation, was recommended. With regard to copper, it was essential for the synthesis of hæmoglobin. Elvehjem and Sherman had shown that pure iron salts were absorbed and stored in the liver and spleen, but that copper was needed to mobilise the iron. On giving copper there was no reticulocytosis; the hæmoglobin percentage rose, but not the number of red cells. The difference of opinion about copper might be associated with local differences in the copper and iron content of cow's milk. The speaker's own experience had led him to conclude that nutritional anæmia could be produced by defective iron supply and cured by adequate doses of pure iron, but that rarely both copper and iron were necessary. Sometimes yeast was required to complete a cure after iron had produced only a limited improvement. Which factor in yeast was beneficial had not yet been proved.

The hæmatological picture of scorbutic anæmia was similar to that of nutritional anæmia. A marked reticulocytosis resulted from treatment with orange juice alone. Anæmia due to deficiency of vitamin C without frank symptoms of scurvy—prescorbutic anæmia—had been described. In view of the poor diet on which scurvy developed it was sometimes necessary to give iron in such cases. Copper should never be given, since it destroyed vitamin C. In cœliac disease hypochromic anæmia due to deficient absorption of iron was the commonest, and every case had responded rapidly and completely to adequate doses of iron. The anæmia of cretinism was regarded as being caused by deficiency of thyroxine.

The hyperchromic deficiency anæmias, with the same hæmatological picture as that in the adult, were very rare in childhood, and were likely to be met with only in cœliac disease. Dr. Parsons did not accept the majority of cases of pernicious anæmia described in young children, and only three cases of bothriocephalus anæmia had been reported under the age of 10 years. The cœliac disease was usually of long standing and had been inadequately treated. An absence of extrinsic factor had been blamed, cure following the administration of marmite; but the speaker had seen two cases in which the anæmia developed while the child was taking marmite, and both of them were cured with desiccated stomach.

Dr. W. A. **Alexander** (Edinburgh) believed that neither clinical observations nor post-mortem studies would shed further light on disorders of the blood. Modern hæmatological technique as employed especially in the researches of Helen Mackay and Parsons had caused a reorientation of ideas. He advised the practical application of their work—notably the prophylactic introduction of substances other than milk and cereals into the diet of babies after six months.

Dr. **Dorothy Price** (Dublin) said her own observations over the last four years had shown there was no marked iron deficiency in infants in Dublin. Of 45 cases of anæmia between 2 and 7 months, only 8 had a hæmoglobin below 60 per cent. About a third had had definite infections. The infants were mostly breast-fed, but weaning was late, pregnancies multiple, and the maternal diet markedly deficient in iron foods. The city water contained only traces of iron, and the water pipes were no longer of iron. It was suggested that the mothers obtained a supply of iron in their tea and potatoes, which were boiled in iron vessels.

Dr. R. E. **Steen** (Dublin) stressed the essential unity of nutritional anæmia of infants and the chronic microcytic anæmia of women during the childbearing period. The blood pictures were identical; the iron reserve was low from hæmorrhage or infection in women, from failure of storage or prematurity in infants. The supply of iron in the diet was deficient in the women and in the children, and the response to iron therapy marked. Achlorhydria was not found in infants, and was of little importance, since it was never the only factor in the production of anæmia, and iron (or iron and copper) alone was specific in cure.

Dr. W. R. F. **Collis** (Dublin) described a case of sub-symptomatic vitamin-C deficiency in which severe anæmia responded to orange juice. Blood transfusion in the treatment of anæmic infants gave a rapid response and reduced the risk of intercurrent infection. A pale child should never be treated with iron without a preliminary blood count.

Dr. H. P. **Wright** (Montreal) referred to a series of 200 babies, of which he had treated a third with iron and copper; the other two-thirds were given a usual diet, which actually contained plenty of iron. There was no noticeable difference in the hæmoglobin or in the incidence of infection, although some degree of anæmia was present in all the cases.—Dr. A. T. **McKay** (Dublin) described a case of severe jaundice and anæmia in a new-born infant, which recovered although liver treatment had no effect on the blood.—Dr. G. W. **Charsley** (London) asked how the iron dosage was estimated.—Dr. **Alan Moncrieff** (London) described his difficulties in making infants take iron according to Dr. Parsons's prescription.—The **President** said he always advised giving broth from crushed bones to artificially fed infants and Blaud's pill (grs. 10–15 t.d.s.) to nursing mothers.

Dr. **Parsons**, in reply, paid a tribute to his co-workers, describing himself as their mouthpiece.

Pulmonary Tuberculosis in Childhood

Dr. **Collis**, in describing the mode of primary infection in pulmonary tuberculosis, said that a droplet containing tubercle bacilli was inhaled and caught in the lung parenchyma: after two to eight weeks without symptoms or signs hypersensitivity to tuberculin appeared, together with certain general symptoms, such as pyrexia, anorexia, loss of weight, erythema nodosum, phlyctenular conjunctivitis, and early pleurisy, while X rays showed focal lung reactions and enlarged hilus glands. The sedimentation-rate of red cells rose markedly. The majority of children—and 60 per cent. of children in urban populations had become tuberculin-positive by the age of 14—passed through this stage with little or no illness. The prognosis was good provided that the dose of bacilli was not overwhelming and the living conditions were good. Autopsy studies did not support this view, but such autopsies on the most diseased group of children were not representative. A number of lantern slides illustrated the complete resolution of the focal lung lesion.

The observations of Borrel on French African troops in the war showed that 90 per cent. were Mantoux-negative and that they reacted to primary infection like the European child, developing sensitivity with some signs of illness after three to four months, and either recovering completely or succumbing to generalised spread. The outcome depended on the treatment received during the initial period; with rest from heavy duties and full diet the majority recovered. He had observed the same response to treatment in children. He believed that the general acceptance of serious prognosis of tuberculosis in infants was due to the rarity with which the diagnosis was made before the disease became generalised. The tertiary lesions, as seen in adult phthisis, were rare in children, but they were important since such patients were a danger to those in the primarily infected group and should be segregated from them. The children with primary pulmonary tuberculosis required convalescent home and not sanatorium treatment, and their education should be continued in open-air classes.

SECTION OF NEUROLOGY

AT a meeting of this section, with Dr. GORDON HOLMES, the president, in the chair, a discussion on

Poliomyelitis, its Epidemiology and Treatment

was opened by Dr. F. M. R. WALSHE (London). Up to four or five years ago, he said, poliomyelitis was generally regarded as an acute specific fever with a phase of systemic infection and constitutional disturbance, followed by the signs and symptoms of meningeal irritation and finally those of involvement of the nervous tissue—namely, paralysis. The port of entry of the virus was believed to be the nasopharynx, whence by the perineural lymphatics the virus reached the subarachnoid space; the cerebrospinal fluid then served as a vehicle for its further distribution. Every item of this would now be challenged except the statement that the original port of entry was the nasopharynx. Pathological investigation indicated that the virus reached the nervous system by the axis-cylinders of the olfactory nerve, entered the olfactory bulbs, and was spread thence within the nervous system by axonal channels. The cerebro-spinal fluid had been found to play no essential part in the carriage of the virus. It would be remembered that the olfactory nerve terminations lay exposed in the olfactory mucosa. Monkeys had been infected by this route, and the spread of the infection had been traced from the mucosa to its destination in the ventral horn cells. We were rapidly approaching a conception of poliomyelitis as primarily and exclusively an infection of nervous tissue. The clinical division into preparalytic and paralytic stages did not correspond to distinct stages in the underlying pathological process, for the development of the paralysis indicated the climax of an action of the virus upon the cell which had already been waxing in intensity for some hours or even days. In other words, the attack upon the nerve-cell had begun before diagnosis was possible.

This conception might explain much that had been obscure in the response of the disease to serum administration, and might indicate the lines upon which treatment had to be approached. It had been assumed that the preparalytic stage was a brief period during which one might hope to neutralise the virus before it began to attack the nerve-cells; but there was probably no such period, and all we could hope for was to neutralise the virus already in the cell before the latter was damaged beyond repair. Experiments held out little hope that this was possible unless serum was given within 24 hours after the inoculation of the virus. On going through the published reports of the 22 years which had elapsed since Netter first employed convalescent serum treatment, certain interesting and significant features emerged. (1) The earliest doses were, by present standards, ludicrously inadequate. (2) The neutralising power of the serum has been unmeasured and unknown. (3) Favourable results had been claimed whether the serum was given intrathecally, intramuscularly, or intravenously. (4) Adequate control of the results of treatment had only exceptionally been undertaken. (5) Even more beneficial results had been claimed for Rosenow's antistreptococcal serum. (6) When control cases were observed in which serum was not given, the untreated cases fared as well as those given serum.

During the 1931 epidemic in New York, of more than 1000 cases diagnosed in the preparalytic stage, about half were treated with convalescent serum; the results gave no indication that the serum was of value either in reducing case-fatality or in preventing paralysis. Indeed, the slight differences between the treated and the untreated groups were against the use of serum. It was difficult to escape the conclusion that Flexner's observations on the inability of convalescent serum to influence the course of the experimental disease unless it was given before the onset of symptoms must apply equally to the treatment to the human disease. Park had expressed a similar view. But, if even the earliest symptoms indicated the action of the virus upon the nerve-cell, then it was always too late to combat the infection. Something would have been gained if the lessons and disappointments of the past led to the more scientific planning and administration of serum treatment in the future. Seeing that the value of such treatment must be regarded as problematical there could be no sound objection to making proper control observations, and in this way the serum could be given a thorough trial.

Dr. R. W. FAIRBROTHER (Manchester) referred to three striking features of the epidemiology of poliomyelitis: the wide distribution but low incidence of cases; the occurrence of the disease in childhood (2–9 years); and the seasonal incidence. The causal agent was doubtless a filtrable virus; it was comparatively resistant to low temperature, glycerin, and 0·5 per cent. phenol, but was readily destroyed by heat over 50° C. and oxidising agents. The probable explanation of the relative limitation of the disease to young people was that most adults were immunised either by a previous attack or by subclinical infection. The site of infection was the nasopharynx, while the chief site of attack was found in the nerve-cells of the lumbar enlargement. E. W. Hurst and himself had found that the route taken by the virus was axonic, the following points suggesting such a route: (1) the necessity of introducing the virus into the central nervous system in order to produce infection;

(2) distribution of the virus after inoculation; and (3) distribution of the lesions after inoculation. This theory had since received much support from experiments carried out in America. In man the virus passed from the nasopharynx by the olfactory hairs to the olfactory bulb, then to the optic thalamus and on to the posterior horns, and finally the anterior horns. Only certain of the nerve-cells appeared susceptible to infection with the virus.

A consideration of the properties of the virus indicated the prophylactic use of gargles, preferably consisting of some oxidising agent as hydrogen peroxide or potassium permanganate. The employment of vaccines, either for prophylaxis or therapy, was unfortunately impracticable for man, since living virus was necessary and the risk was excessive. Serum therapy, using convalescent human serum, had been tried, but the results had been conflicting. The disease was essentially one of the central nervous system, and consequently the virus was very difficult to attack. It had been found experimentally in the case of vaccinia that once the virus had penetrated a cell it was not materially influenced by immune serum. In the case of poliomyelitis, the virus had penetrated the cell from the beginning. But judging by the clinical course taken by the disease in man, one was justified in assuming that the human nervous system was comparatively resistant to infection with the poliomyelitis virus; in monkeys the mortality-rate was 95–100 per cent., whereas in man it was only 10 per cent. This gave some hope for serum therapy. It was probable that by giving a large dose of potent serum in the early stages the defence mechanism might be strengthened so that in the presence of a mild or moderate attack the damage might be reduced. In the presence of invasion by a large dose of a virulent virus, serum therapy did not appear to offer much hope. It had been stated that the intrathecal inoculation of foreign serum might precipitate an attack; but if the axonic spread of the virus was accepted there was no justification for this statement. There did not appear to be much advantage in using the intrathecal route alone, for in view of the increased permeability of the vessels of the affected region, antibodies in the blood stream were the most likely to reach the damaged nerve-cells.

Dr. J. PURDON MARTIN (London) said that none of the knowledge recently acquired justified such complete abandonment of former views as was exemplified by Dr. Walshe's paper. He was convinced that the disease ordinarily consisted of a general as well as a nervous infection. Enlargement of the lymph glands was found post mortem in human cases and the presence of the virus in human mesenteric lymph nodes had been demonstrated. Various investigators had found the virus in the blood of experimental monkeys. A fact strongly suggestive of general infection was the development of immune bodies in the blood. Occasional cases encountered clinically seemed inexplicable on any theory other than that of general infection; he quoted instances in which the onset of poliomyelitis had followed fractures. The nervous infection, however, was not secondary to the blood infection but more or less concurrent with it. The time relation between the general and nervous invasions was likely to have an important influence, for if the general infection anticipated the nervous, then the development of immune substances would afford protection to the nervous system at an earlier stage. From the indefinite character of the earliest symptoms of poliomyelitis, it was impossible to decide whether they were due to actual infection of the nervous system or to a toxic action on the nervous system of a general infection.

The results of recent work provided an opportunity of simplifying the clinical description of poliomyelitis. Experimental work had shown that the cells of the cerebrum had a particular resistance against this infection, and even with cerebral inoculation a spinal and not a cerebral form of the disease was produced. The term "polio-encephalitis" should therefore be abandoned and the encephalitis of children should be studied and described without confusion with poliomyelitis. There remained the spinal and brain-stem forms and abortive cases. Experimental work had shown that the spinal form was the usual result when the infection was primarily cerebral, and it seemed likely that in most human cases infection of the nervous system took place by way of the olfactory nerves. When the infection fell with selective severity on the brain stem some unusual element was at work. In such cases, infection probably occurred from the bed of the tonsil by way of the ninth or tenth cranial nerve. The speaker referred to cases of the bulbar form in which the disease followed tonsillectomy. In other bulbar cases the similarity of the symptoms suggested that the path of infection had been the same and this argument was supported by pathological findings.

In ordinary circumstances the disease was arrested by the development of immune antibodies in the patient's blood and it was rational to endeavour to provide the patient with a sufficiency of immune substances at the earliest moment. It was not justifiable to conclude that because serum failed to check the disease in the very susceptible monkey which had received a large intracerebral inoculation, it could not check it in the much less susceptible human subject who had received a much smaller dose. A concentrated serum was greatly to be desired but in its absence we must give large quantities of serum of proved immunity or transfuse whole blood from an immune donor. Testing of the blood of professional donors should be undertaken. Even more to be desired than a concentrated serum was a means of producing immunity and some method of recognising the susceptible members of the population.

Prof. W. S. HAUGHTON (Dublin) spoke from the orthopædic standpoint. During the first stage it was necessary to bear in mind what might happen during the third, and try to anticipate deformities. The principles of the orthopædic treatment were to give physiological rest to the muscles, to keep the patient in bed till all tenderness had disappeared, to splint with over-correction, and later to train the affected muscles. Tendon transplantation for disabilities caused by poliomyelitis had been frankly disappointing. For partial flail ankle he had found the operation of subastragaloid arthrodesis very successful. He described his own method of arthrodesis of the knee, which gave bony union in more than 90 per cent. of cases.

Dr. J. R. COLLINS (Cheltenham) discussed the procedure which should be adopted in a public school when a case of poliomyelitis had occurred. He thought that the school should be conducted strictly on open-air lines; if this was impossible all the doors and windows should be kept open and the pupils should be allowed out for a few minutes after each class. He doubted the wisdom of nasal douches.

Dr. R. G. GORDON and Miss MAUD FORRESTER-BROWN (Bath) showed a film illustrating the treatment and training of poliomyelitis cases in the chronic stage.

Dr. JEAN MACNAMARA (Melbourne) said that to draw analogies between the pathogenesis of poliomyelitis in man and the experimental disease in monkeys might lead us far astray, for the experimental investigators were using strains of virus that were "educated" to attack the nervous tissue of the monkey. Thus Faber[1] used the Flexner mixed virus strain which had been adapted by intracerebral passages to monkey nervous tissue for some 20 years. No experiments had yet been published on the method of spread in monkeys inoculated intranasally with a strain passed only by the intranasal route from the time of its isolation from the human. Even if this were done however it would not be safe to draw conclusions about the pathogenesis of the natural disease in man. We knew from other diseases, such as yellow fever, that a virus might behave very differently in different hosts. No one could fail to be impressed by the difference between the preparalytic stage of the disease in humans and in monkeys. It was difficult for anyone who had studied human poliomyelitis to regard the severe early illness, the fever and toxæmia, as secondary to involvement of nerve-cells which gave no evidence of damage until five or seven days later. She regarded human poliomyelitis as showing both viscerotropic and neurotropic elements, the former anticipating and more frequently predominant than the latter. Henceforth it would be necessary to differentiate between human strains and monkey strains of poliomyelitis virus and review again the inferences drawn from neutralisation tests against monkey-adapted virus. The work in Australia had been approached eight years ago with something of the same scepticism which Dr. Walshe showed at present. Experience had taught them, however, that it was possible to obtain, prepare, care for and use serum from a patient recently paralysed in such a manner as to protect from severe paralysis those patients who were unable to deal adequately with the disease themselves. The observations made in New York during the 1931 epidemic were open to much criticism, especially in matters of technique. The opinion of the poliomyelitis committee of the New York Academy of Medicine was that the results were inconclusive and that more accurate work should be done in the future.[2] It was difficult to prove the value of any therapy in clinical medicine; the widespread use of diphtheria antitoxin still rested on a summation of clinical experience rather than on statistical proof. Until we had a means of producing immunity, it was surely wise to learn to use the only weapon at present available against poliomyelitis.

Mr. B. WHITCHURCH HOWELL (London), Dr. WICHT, and Dr. A. GARDNER ROBB (Belfast) also spoke.—The PRESIDENT, in summing up the discussion, said he thought that in regard to serum treatment the verdict "not proven" was probably the best one.—Dr. WALSHE, replying to the discussion, said we must endeavour to apply the same standards of evidence in regard to treatment as we applied in other departments of scientific inquiry.

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[1] See THE LANCET, 1933, i., 1352.

[2] Ibid., 1932, ii., 1354.

REVIEWS AND NOTICES OF BOOKS

Recent Progress in Medicine and Surgery, 1919–1933

By Various Authors. Edited by Sir JOHN COLLIE, C.M.G., M.D. With a Foreword by Lord HORDER OF ASHFORD, K.C.V.O. London: H. K. Lewis and Co., Ltd. 1933. Pp. 368. 16*s.*

IN this book Sir John Collie has attempted a record of the medical and surgical progress achieved since the end of the war. He has chosen 21 subjects for chapters mainly on account of the progress made in these subjects, bearing in mind also the practitioner's need to know of changes in the treatment of common maladies. Lord Horder describes the team of writers as active, original, and familiar, each one having authority to write on his subject; but he gives one word of warning—namely, only to embark upon this book when the brain is fresh and the desire for information is keen. It is no book for an idle hour, and if it is true, as he states, that it would be hard to find any new fact of primary importance, whether added to the science or to the art of the doctor's profession during the period covered, which is not recorded in this volume, then the mental sweat will have been justified; and in the validity for this claim lies the justification of the book.

There is no common thread running through it, and no attempt at any integration of the several parts. Some of the chapters are records rather of our ignorance than of our knowledge, and where they are records of knowledge, the particular writer is sometimes unaware of, or has not emphasised, its limitations. Throughout the book the paragraphs dealing with treatment are admirable, but it was perhaps inevitable that within the limits of space it was not practicable to give a balanced account of the experimental side of the work from which the treatment has been deduced. There is a certain tendency to accept preliminary experimental results as a guide to treatment, and yet this may be a pleasant reaction from the time none too distant when there was a portentous lag between the discovery of new principles and their application in practice. Searching further, frankly, for examples of what there may be to criticise, we may regret the statement that in narcolepsy there is no evidence of an associated structural lesion or that in dealing with the filtrable viruses the author does not differentiate clearly between an inclusion body and an elementary body. But the errors are so few as only to be detected by experts, and the several chapters do give a clear résumé of the present position, a fair cross-section of the currents of thought in relation to many of the most urgent medical problems of our time.

It only remains to add that the book is well produced, the format is attractive, the illustrations well selected, and the price moderate.

Blood Diseases in Clinical Practice

Second German edition. By Prof. Dr. P. MORAWITZ. Translated by A. PINEY, M.D., M.R.C.P. London: J. and A. Churchill. 1933. Pp. 102. 7*s.* 6*d.*

Prof. Morawitz concludes the most recent edition of his book on Blood Diseases in clinical medicine with the wise words "Blood examination is valuable, even indispensable, to those practitioners who can view the blood picture as a part of the whole morbid process; but this is so only if he remembers that the variations of the organism present endless possibilities, and cannot be forced into any fixed schematic arrangement." This gives an indication of the scope and ideals of this admirable introduction to modern clinical hæmatology. Prof. Morawitz recognises that the clinician studying blood diseases is no longer confined to morphological methods; clinical and physicochemical methods are becoming increasingly important. In modern practice the blood picture is no longer purely morphological. Without neglecting essential laboratory findings he gives in a small compass the result of many years' careful clinical experience in the diagnosis and treatment of blood diseases both rare and common. The value and significance of nucleotide therapy in agranulocytosis appears the only omission in an otherwise comprehensive summary which should prove a helpful guide to the busy practitioner. No encouragement is given to use any but accurate methods. The quick but inaccurate Tallquist scale for hæmoglobin estimation is rightly dismissed as too inaccurate for even the most modest demands. The translation and the index are in every way satisfactory.

Treatment of Diseases of the Skin

By W. KNOWSLEY SIBLEY, M.A., M.D., B.Chir. Camb., M.R.C.P. Lond., Physician to St. John's Hospital for Diseases of the Skin. London: Edward Arnold and Co. 1933. Pp. 223. 10*s.* 6*d.*

THE popularity of this comprehensive manual, first published in 1912, is evidently undiminished, and it continues to provide up-to-date information on an increasingly important subject. It is devoted purely to treatment, and is not designed to take the place of even the smaller text-books on dermatology; but it can be recommended as an excellent synopsis of modern technique. A method which the author appears to have tried extensively is passive congestion by Bier's suction cups. If the plate of leucodermia of the back of the hand on p. 110 is an example of his success in this most intractable affliction, dermatology owes him a debt. It seems a pity that so simple a procedure is not more widely known, for it could do no harm and its application can safely be entrusted to the patient himself. The description occupies only two lines, and but for the illustration would be swamped by the various more orthodox therapeutic measures at present in vogue. The half-tone plates which illustrate the work are hardly up to modern standards of reproduction, and savour too much of the "before and after treatment" variety. The book contains a good index, a compendium of more than 150 prescriptions, and the dosages are now both in English and continental measures.

1. Welfare of the Infant and Child

By VICTORIA E. M. BENNETT, M.B., B.S. Lond., D.P.H. Cantab., Lecturer and Examiner in Public Health at the Battersea Polytechnic. London: George Routledge and Sons, Ltd. 1933. Pp. 312. 7*s.* 6*d.*

2. If I Have Children

By G. FRANCIS SMITH, M.R.C.S., L.R.C.P. London: Humphrey Milford, Oxford University Press. 1933. Pp. 133. 5*s.*

1. The decrease in the size of the family which is characteristic of the present century has been associated with a lively awakening of interest in the welfare of the child, of which the steady stream of literature emerging from medical and lay sources is a manifestation. These two books exemplify different methods of approach. Dr. Bennett considers the welfare of the child partly from the public health point of view, though it is clear that she also writes with good clinical judgment. Her book is addressed principally to students and nurses, and is intended to cover the syllabuses in the care of infants and children of the Royal Sanitary Institute, the Incorporated Institute of Hygiene, and so forth. She has been successful in combining a scientific treatment of her subject with a minimum of scientific jargon, and her book could be read with benefit not only by intelligent parents but by most members of the medical profession. The chapters on mental defect and household sanitation are useful additions and round off a well-written and thorough exposition.

2. As the title of his book may imply, Dr. Smith apparently aims at being helpful to young parents. He flits lightly from the subject of routine circumcision to that of a rationalist religion, and whilst his 133 pages contain much common sense they also contain many platitudes, some of which he tabulates and labels "Aphorisms." In general, his treatment particularly of such subjects as infant feeding is too superficial to be of any practical value, whilst some of his statements—e.g., that Grade A milk given to infants need not be boiled or pasteurised—are definitely misleading.

Science of Human Reproduction

By H. M. PARSHLEY, D.Sc., Professor of Zoology, Smith College, Mass. London: George Allen and Unwin. 1933. Pp. 319. 12*s.* 6*d.*

IN a preface the author informs us that the purpose of his book is to present the scientific facts and theories of reproduction in sufficient detail to accomplish two things: (1) to answer most of the questions that non-professional students and intelligent laymen are likely to ask about the anatomy and physiology of human procreation; and (2) to provide the biological basis for a scientific attitude towards sex and its problems. These objects are well fulfilled. Though the volume is not likely to be of much value to medical readers, who will have acquired most of the information in their preclinical and clinical studies, it should satisfy the requirements of inquiring laymen desiring a full exposition of the anatomy and physiology of the reproductive system as seen in a biological perspective. Prof. Parshley writes in an agreeable style; his book is fully illustrated and abundantly documented with references to papers and books which have appeared as late as 1933. The ancillary problems of sex are too numerous and complex to be covered, even in an elementary way, in a book of this kind. Prof. Parshley has refrained from discussing contraception and he deals very cursorily with those medico-psychological aspects of his subject which are usually connoted by the term sexology; but he has included a well-written chapter on population and eugenics.

Gastric Anacidity

Its Relations to Disease. By ARTHUR L. BLOOMFIELD, M.D., Professor of Medicine, Stanford University, San Francisco; and W. SCOTT POLLAND, M.D., Instructor in Medicine, Stanford University. London: Macmillan and Co., Ltd. 1933. Pp. 188. 12*s.* 6*d.*

THE significance of defective gastric secretion is a problem which has occupied the attention of medical investigators for over a century without definite result. A considerable and scattered literature has grown up, and in harvesting this Prof. Bloomfield and Dr. Polland have carried out a really valuable piece of work. Owing to the rapid advance that has been made in biochemical technique, it has been peculiarly difficult to make any comparison between the results of the earlier workers and those being obtained at the present time. Indeed, the authors state emphatically that in their opinion none of the criteria of a satisfactory functional test of gastric secretion are fulfilled by the usual test-meals employed, since in many cases the stimulus to secretion is inadequate and only the most general idea of the volume of secretion is obtained. They themselves advocate the use of the histamine test, injecting 0·1 mg. of ergamine per 10 kilogrammes of body-weight and employing continuous aspiration, after the fasting gastric juice has been collected over two or three ten-minute periods and has reached a minimum. The subsequent aspiration is carried out over as many ten-minute periods as desired. By this test the same patient is found to give an almost identical reaction on different occasions, and it is claimed that in the present state of our knowledge the most rigorous proof of true "anacidity" is the demonstration of a neutral reaction (pH 7·0) in uncontaminated gastric juice obtained after maximum histamine stimulation. By this criterion many of the cases of achlorhydria described *after test-meal* stimulation would have to be excluded, and the whole concept of hypochlorhydria considerably modified.

It is rather startling to find to what small compass our actual knowledge with regard to the significance of defective secretion of hydrochloric acid by the stomach is reduced when it is subjected to critical examination. Pernicious anæmia and carcinoma of the stomach are associated with anacidity, and defects of secretion have been found to occur with much less constancy in a large number of other diseases. The interpretation of these facts is still largely speculative. The significance of anacidity occurring in association with the microcytic hypochromic anæmia of middle-aged women is considered in some detail, and it is of interest that Bloomfield differs from most English writers on the subject in regarding the concept of "achylic hypochromic anæmia" *as a specific disease* as untenable.

The volume as a whole provides a valuable review of the literature, but is written from the point of view of personal observation and the authors have contributed to the knowledge of most aspects of the subject. The numerous diagrams and tables are excellently presented.

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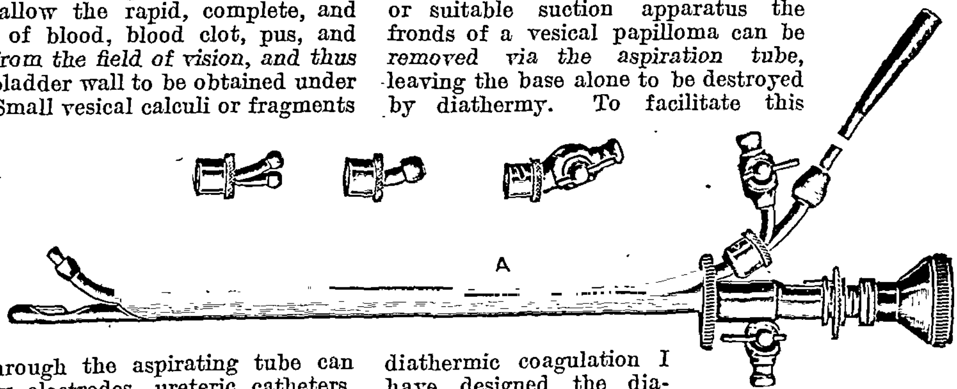

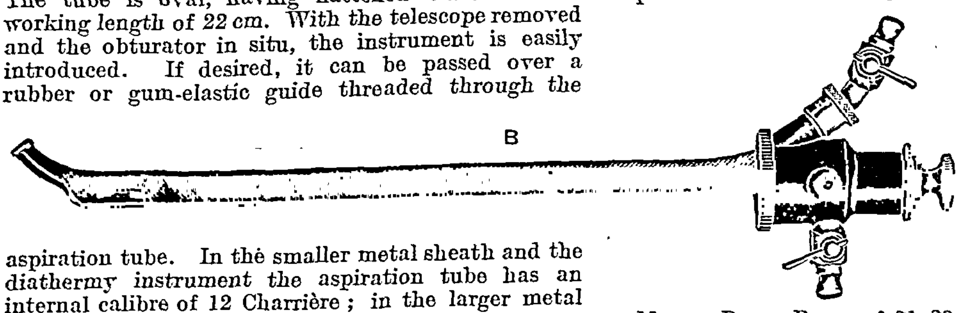

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THE LANCET

LONDON: SATURDAY, AUGUST 19, 1933

PUBLIC UTILITY SOCIETIES: A SOUND HOUSING POLICY

THE report[1] of the Departmental Committee on Housing, presided over by Lord MOYNE, will satisfy more expectations than it disappoints. It is true that the scheme for a National Housing Board, advocated by Sir RAYMOND UNWIN, has been turned down, but the constructive proposals of the Committee will find favour with many of the warmest supporters of that plan. Briefly, the Committee's plan is to give local authorities compulsory powers to acquire, on behalf of approved public utility societies, defective working-class houses having a prospective life, when reconditioned, of not less than 20 years. The public utility society movement is to be stimulated by the establishment, on a statutory basis, of a strong Central Public Utility Council vested with important powers and functions; local approved public utility societies will be nationally financed to enable them to purchase and recondition the properties acquired by the local authorities, and to provide new accommodation for overcrowded persons displaced from the properties acquired. A modified subsidy is proposed for the latter purpose but not for the reconditioning. These are wholly admirable proposals which are worked out in detail and with a discerning eye for all the difficulties which have hitherto combined to prevent the fruition of many of the provisions designed in the past to secure better housing for the poorer paid working classes. The Committee see in the encouragement of the voluntary housing movement the hope of filling in what they rightly describe as "the gap in the Government's housing policy." The plan of encouraging the establishment all over the country of public utility societies which will become owners of extensive blocks of working-class property at present of an unsatisfactory character is one which will be cordially approved by everyone who, like the Committee, believes in the principles of private property and private ownership. But, as the report puts it:

> "That private ownership, if it is to be retained in the class of property which we are considering, must be efficient and conscientious and cease to be, what it too often is, an illegitimate gamble on the inactivity of the local authority. Many private owners keep their property in excellent repair and discharge fully the modern obligations of ownership. On the other hand there are, as we have pointed out, many who for a variety of reasons do not. We think that the time has come when this latter class of owner should be replaced by a public or quasi-public authority."

The Committee foresee that in some cases existing municipal housing estates will also be transferred to the local public utility society.

The utilisation for national purposes on a statutory basis of the voluntary housing movement is an eminently wise move. It will enable advantage to be taken of the great and growing public interest in the housing of the working classes, and at the same time will do nothing to check the activity of the local authorities in their particular sphere, which is definite slum clearance; in practice, if the experience of existing voluntary societies is any guide, this activity will be greatly stimulated. The disinterested enthusiasm of the public utility society is precisely what is needed to deal with the difficult problems arising out of the ownership of the class of property common in our large towns, which, when owned purely as an investment out of which the utmost immediate financial result is to be extracted, tends to be greatly overcrowded, and more than half a slum, but which by enlightened management can be turned into something very different—viz., decent houses for working people at rents they can afford to pay. That the Committee appreciate this importance of management as the key to the solution of the most difficult part of the housing problem, is shown by the following quotation from the report:—

> "We are as much impressed by the need for improved management as for an improved standard of repairs. As is well known, this was the view taken by Miss Octavia Hill and her fellow pioneers when they first approached the problem some 70 years ago. It has often been said that a bad landlord makes a bad tenant, and the converse is not less true. The basic principle of Miss Octavia Hill's work is the mutual obligation and responsibility which must exist between landlord and tenant if good results are to be obtained. In her view, which we share, management lies at the root of the problem. A good standard of repair without good management is not enough, but in practice the two things normally go together. A good landlord does not wait for a complaint before he orders repairs, still less does he wait for a notice from the Local Authority. Such a policy of management is shortsighted from the landlord's own point of view, and, in a time of housing shortage, inflicts an iniquitous degree of hardship on tenants who can find nowhere else to go. At the present time there are still too many private landlords who allow their properties to be mismanaged in this way, and too many Local Authorities who fail to enforce the law against them."

The Committee recommend that management should be based on the Octavia Hill system, and wherever practicable women housing estate managers should be employed. On the subject of "undesirable tenants" for whom provision must be made if the slum problem is to be solved, the report quotes from Miss Octavia Hill's evidence before the Select Committee of 1882:—

> "I do not believe that this difficulty will ever be met except by a good deal of volunteer work; whether the large Societies will enlist volunteers, or whether it will be done by private enterprise, I do not know; but I am certain that you can hunt the poor about from place to place, rout them out of one place and drive them to another; but you will never reach the poor except through people who care about them . . ."

That was a prophetic utterance which touches the very heart of the housing problem. For it is not enough to demolish the slum and replace it with new houses; the slum mind must be got rid of too and that can only be done by "people who care" and who will put service before immediate profit. We say immediate profit advisedly, for while the actual work can only be done on a basis which will do no more than pay a low rate of interest on capital and leave nothing over for dividends, the ultimate national dividend in the form of improved health of body and mind, and capacity for citizenship, is beyond calculation.

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[1] Cmd. 4397. H.M. Stationery Office. 1s. 3d.

So much for the social side of the Committee's proposals. The financial side is also extremely interesting and there is suggested a new principle of compensation for acquisition of private property by public authority. This is described as the "refund" basis; the price to be paid by the acquiring authority will be the purchase price paid by the owner himself, or if the premises had been inherited, then the value accepted for death duties. In the case of leasehold interests the payment will be an apportioned part of the value according to the number of years unexpired. In a word owners are to "get their money back," and while no doubt anomalies will arise on this as on any other basis of compensation the plan appears fair, very simple to work, and what is of equal importance, likely to be accepted with less demur by property owners than the present statutory basis under the clearance area provisions of the 1930 Act. Money for the operations of the local public utility societies, including purchase and repair of properties, and such new buildings as will be necessary to rehouse the surplus population due to the decrowding of acquired properties, will be advanced to the societies, on the advice of the Central Council, by a Central Financing Authority the functions of which will be discharged in the first instance by the Minister of Health. The necessary funds are to be provided by the National Debt commissioners, and while the normal advance to a local society will not exceed 90 per cent. of the amount required on a strictly prescribed formula, in exceptional cases as much as 100 per cent. may be advanced. Normally the 10 per cent. balance will be obtained by the issue of shares of the society bearing interest not exceeding 5 per cent. The general principle will be to secure that the local society has a financial interest in the working of the scheme and the committee are satisfied that there will be no undue risk of loss to the Exchequer. A margin will be allowed for administrative expenses so that the scheme may be self supporting and a common reserve fund will be set up to minimise whatever financial risk may be involved. With the degree of control which will be exercised by the Central Council (to consist of not more than five persons paid on a part-time basis, one member at least to have special financial qualifications) the financial risk involved will undoubtedly be very small compared with the results which may be confidently expected to accrue.

No subsidy is proposed for reconditioning, although this was within the terms of reference of the committee. The rate of the special rehousing subsidy is proposed to be £5 per house for 60 years, and £12 per tenement for 60 years; taking the average all-in cost (including land, roads, and sewers) of a three-bedroomed house at £350, and of a three-roomed tenement at £600, and the annual allowance for repairs and management at £5 10*s.* for the house and £8 (including stair lighting and caretaker) for the flat and cost of money at 3⅝ per cent., these subsidies will produce maximum weekly rents of 1*s.* 6*d.* a room, exclusive of rates, for the non-parlour three-bedroomed house, and 2*s.* 9*d.* a room for the three-room tenement. The finance has been worked out in full detail in the report, and we are bound to say that the calculations have a more convincing appearance than some of the figures and estimates given by the Minister of Health when the recent Housing Act was under discussion in the House of Commons. The report as a whole produces the impression of a really workable scheme doing justice to all parties—owners, tenants, local authorities, and public utility societies alike—devised by people who really understand the present needs of the situation and are determined that they shall be met. In time to come this report may well be hailed as the charter of the public utility society movement.

LESSONS FROM PELLAGRA

THE medical history of pellagra goes back over more than 300 years. In 1600 BARNINO observed in certain Indian tribes a disease which from the description appears to have been pellagra, and he associated the disease with the consumption of maize. Ever since then maize has been connected with pellagra as a causative factor. As a recent writer puts it "to weave a chronicle of pellagra without encountering the visage of maize seems almost impossible." At first the disease was attributed to a toxic substance formed in maize when it became "spoiled." With our increasing knowledge of nutrition during the last 30 years there has been a corresponding change in the theories concerning the ætiology of pellagra. It came to be recognised that different proteins do not all possess the same biological value, and that some, owing to a lack of certain important amino-acids, were much less valuable than others in maintaining the nutrition of an organism. The lack of tryptophan and lysine in the main protein of maize, zein, at once suggested this defect as a possible cause of pellagra. The subsequent discovery of vitamins led to the idea that pellagra was caused by the absence of a specific vitamin, B_2, closely related to but different from the anti-neuritic vitamin B_1. The story is told very clearly by Miss HARRIETTE CHICK, D.Sc., in her De Lamar lecture which we published last week. Dr. CHICK considers that neither the vitamin deficiency by itself nor an amino-acid deficiency can account completely for the incidence of pellagra in man. In order to get over this difficulty she reverts to the old idea of a toxic substance present in maize. This toxic substance is however supposed to be found not only in maize which has deteriorated, but even in normal maize, in analogy with the hypothetical toxamins which MELLANBY supposes to be present in all cereals and to which he ascribes rachitogenic effects. The pellagra-producing toxamin of Chick is supposed to be neutralised by vitamin B_2, and it is only in the absence of this vitamin that the toxamin produces pellagra.

The presence of such toxamins in the normal basic foodstuffs cannot be said to rest on a secure experimental basis. In fact, the conception is at present little more than a speculation which has not met with general acceptance. But since the suggestion has been made and, if found to be true, would be of fundamental importance, it is to be hoped that it will be either thoroughly tested or abandoned. One feature of pellagra as it appears in man which cannot be accounted for in this way is its seasonal appearance, subsidence, and recurrence. Nor is it quite clear on what grounds Dr. CHICK excludes the possibility that an infection may play a part in the ætiology of pellagra. The fact that the disease is not contagious but attacks only persons living on an inadequate diet is not a sound argument. Not every infection is contagious; tetanus is a well-known example. Still more to the point are the infections occurring in persons living on a diet deficient in vitamin A, while persons in close contact with them but living on a complete diet remain free. The difficulties met with in our understanding of the diseases of nutrition are to a large extent a legacy of the not very fortunate conception of "specific deficiency diseases" which was put forward in the early years of the study of vitamins. This conception, which finds expression in such terms as "anti-neuritic," "anti-rachitic," "anti-xerophthalmic," and "anti-infective" vitamin, postulated a direct causal relationship existing between vitamins and certain diseases. The disease was supposed to spring into being without any intervening pathological change as soon as the supply of vitamins in the food is withdrawn and any reserves in the body are exhausted. At present it is widely believed, for instance, that rickets must necessarily appear when the anti-rachitic vitamin D is not present in the diet in sufficient amount. But more than ten years ago SHERMAN and PAPPENHEIMER published experiments showing that rickets does not occur, in the absence of vitamin D, if the proportion of calcium and phosphorus in the diet is kept near an optimal value, and this view is endorsed by such authorities as McCOLLUM and SIMMONDS. The real function of vitamin D is to correct the absorption and assimilation of calcium and phosphorus when they are supplied in unsuitable proportions. The term "anti-rachitic" vitamin is therefore misleading in so far as it gives the impression that the absence of this vitamin must necessarily be followed by the disease. Some pædiatricians are beginning to doubt if the indiscriminate dosing with cod-liver oil and other vitamin-D preparations is altogether an unmixed blessing, and whether it would not be more rational to attend to the ordinary diet of the pregnant and nursing mother and of the growing child.

A similar neglect of the pathological basis of the condition produced by deficiency in vitamin A has led to a belief that this vitamin has a general anti-infective action. Infection is an abstract conception, comprising a number of processes differing widely in the nature of the infecting organisms, the virulence, the portals by which they enter, and the reaction to them of the infected organism. The startling claim that a vitamin could counteract all these different processes has been subjected to extensive experimental examinations which, as summarised in recent papers[1] by Mr. L. J. HARRIS, D.Sc., have failed to substantiate it. HARRIS's own observations have led him to confirm the conception put forward by W. CRAMER ten years ago that in the absence of vitamin A the mucous membranes of the respiratory and digestive tracts undergo an atrophic change, as a result of which the bacteria normally inhabiting these tracts invade the mucous membranes, and from there pass into the blood stream to set up metastatic infections in distant organs. This conception limits the relation of vitamin A to infection to a prophylactic action on the mucous membranes, mainly against the rather avirulent organisms normally in contact with them.

It is possible that the difficulties encountered in the experimental studies of pellagra may be due to a similar neglect of pathology. In the disease, as it occurs in man, extensive lesions of the digestive tract have been found. That investigation along such lines may help to solve the riddle is suggested by recent experience in Denmark.[2]

INJURIES OF THE TENDONS AND NERVES OF THE HAND

BOTH as handicap to the wage-earner and source of loss to insurance companies, injuries of the tendons and nerves of the hand rank high in economic importance. Owing to the close packing of the structures around the hand and wrist, even a clean-cut wound there is liable to give rise to a complicated lesion; and many of the injuries caused by machinery are anything but clean-cut. Often, however, the complicated nature of the lesion is not appreciated at the first examination. The great majority of these patients must be seen in the first place in the casualty department of a hospital, and commonly the main indication is to arrest bleeding. Antisepsis in some form is also applied. The further treatment is left to the discretion of the casualty officer, and in many cases primary tendon or nerve suture is done in the casualty theatre. This practice was condemned by almost every speaker in a discussion held by the British Orthopædic Association two years ago, when Mr. R. C. ELMSLIE, the president, was emphatic that the operation should not be regarded as an emergency.[3] The diagnosis of the extent and nature of the injury is often in itself a matter for a fair degree of skill and experience; the operation of suturing nerves and tendons may be most delicate; and, most important of all, no amount of skill can ensure primary union of the wounds, and without primary union of the skin tendon suture has little or no chance of success. As Mr. H. C. EDWARDS said in the opening paper [4] of the discussion just mentioned, the operation should be performed under ideal conditions, after routine preparation of the skin. It would be well, therefore, if the primary operation, when carried out in a casualty department, were confined to thorough cleansing of the wound and arrest of hæmorrhage, the skin edges being trimmed where necessary, and sutured. Even for cases admitted straight to the wards it is probably good policy to concentrate on the asepsis and primary healing of the wound, and postpone more radical measures till the risk of sepsis is over. Immediate suture of nerves and tendons is not essential for the return of satisfactory function; asepsis and primary union, on the other hand, are all-important.

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[1] THE LANCET, 1932, ii., 614; Brit. Med. Jour., August 5th, 1933, p. 231.

[2] See THE LANCET, 1933, i., 1356.

[3] THE LANCET, 1931, ii., 1025.

S. L. KOCH and M. L. MASON,[5] of Boston, who have made a special study of this branch of surgery, refer to the frequency with which severe lesions, even division of the median or ulnar nerve, are missed at the first examination; and on several occasions they have found one end of the median nerve sutured to a cut end of tendon. More often than not the degree of injury found at operation has been greater than was expected; for example, in cases where spontaneous recovery of a partially divided nerve was being hopefully anticipated there was complete division with separation of the nerve ends. The points on which KOCH and MASON lay emphasis are careful examination to determine the extent of the injury before trying to repair the damaged tendons and nerves; thoroughness in aseptic technique; primary union of the skin, especially where there is injury to tendons with sheaths; and the utmost gentleness in handling the tissues, so as to avoid further trauma. Sponging of the wound during operation is one cause of trauma, and to avoid it they recommend the use of a tourniquet to secure a bloodless field. Local anæsthesia is condemned as likely to increase the damage to the tissues; moreover, it is difficult to apply a tourniquet for long if the patient is conscious, and adrenaline, which is almost essential as an adjuvant in prolonged local anæsthesia, should not be injected if the tissues are extensively damaged. Another useful piece of advice given by KOCH and MASON is that the incision should be planned so that a flap of skin will lie over the site of the tendon suture; troublesome adhesions between the tendon and cutaneous scars are thus avoided. In the finger, they remark, adhesions are too often encouraged by suturing both flexor tendons, when suture of the profundus alone would give good function and would not leave a mass of scar which obstructs flexion. In the British Orthopædic Association's discussion, Mr. R. WATSON JONES recommended that the sublimis tendon should be completely cut away. When dealing with lesions of the group tendons on the front of the wrist, it is useful to know that KOCH and MASON have obtained almost as good results by suture of the tendons en masse as by painstaking union of individual tendons. Grafts from the tendons of the foot have proved satisfactory, but the same cannot be said for nerve grafting. There are a few scattered reports of successful attempts, but when accurate end-to-end suture of the epineurium is impossible, the result of any measures will be uncertain, and failure is probable.

That the treatment of these injuries deserves very special attention, no one who has had to attend compensation cases will question. Even such an apparently simple injury as subcutaneous rupture of the extensor communis tendon opposite the distal interphalangeal joint seems as often as not to leave a permanent and disabling deformity. There is no consensus of opinion about the right form of treatment; many surgeons would not agree with MASON's view that the rupture should always be repaired by open operation. The more extensive tendon and nerve injuries incidental to industrial life often mean the loss of livelihood to the wage-earner of the family, and involve large sums of money in compensation. It is not irrelevant to recall the experience of a Liverpool insurance company which now finances the treatment of cases of Colles's fracture among its clients, and finds that this saves nearly £400 per patient.

ALKALOSIS AND EPILEPSY

THE baneful effect of alkalosis and the beneficial effect of acidosis on the incidence of epileptic fits raised hopes some years ago that epilepsy might prove to be simply an expression of disordered acid-base balance. So far, however, no convincing evidence of such a change has been obtained. One of the main difficulties in research on epilepsy is that, apart from the brief aura, the onset of the convulsion can rarely be foreshadowed and biochemical observations in the all-important preconvulsive phrase are accordingly sparse. Once the fit has begun numerous metabolic changes can be demonstrated, but it does not seem permissible to regard these as anything more than direct consequences of violent muscular effort.

Dr. F. L. McLaughlin and Dr. R. H. Hurst [1] have recently examined the hydrogen-ion concentration, alkali reserve, and lactic acid content of the blood in a series of cases of epilepsy during and between fits. During the convulsion, and for a short while afterwards, the pH and alkali reserve were found to be abnormally low—this agrees with the observations of other workers—while the lactic acid content was considerably raised. But as similar changes can be provoked in normal subjects by violent exercise it is evident that this acidosis is due partly to respiratory embarrassment in the tonic stage and partly to excessive production of lactic acid by the muscles in the clonic stage of the fit. In the intervals between convulsions, the alkali reserve and lactic acid content of the blood did not fall outside the normal limits, although the pH tended to be rather high. The investigators were fortunate enough to obtain several specimens of blood a few minutes before convulsions began, and in none of these was the acid-base balance or lactic acid content abnormal. These findings are therefore essentially negative; but in confirming the current opinion that alkalosis plays no significant part in the ætiology of epilepsy they help to clear the ground for future research.

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[4] Ibid., 1933, i., 65.

[5] Surg., Gyn., and Obst., 1933, lvi., 1.

[1] Quart. Jour. Med., July, 1933, p. 419.

ANNOTATIONS

HERMANN SAHLI

To the present generation the name of Sahli stands for one or more instruments in familiar use in clinical medicine, and for a prodigious text-book of medical diagnosis; but 30 years ago he was one of the stars in a constellation which drew students to Berne from all parts of the continent, for no other medical school possessed at the same time a Kocher, a Sahli, and a Langhans. Hermann Sahli was born in Berne in 1856, and spent the whole of his 78 years there. From his father, a parliamentary jurist, he received his early training in exact thinking; on his mother's side was a long tradition of nature study. His youthful bent was towards natural science, and it was only because that discipline was so little represented in the academic curriculum of the 'seventies that he took a medical course, qualifying in 1878. Ten years later he succeeded Lichtheim as director of the medical clinic at the Inselspital. The methodical examination of the human body was then developing in Berne as elsewhere along surgical and pathological lines, but Sahli made the study of medical diagnosis live in the minds of his students. The characteristics of his teaching were an intense concentration on what could be observed with the unaided senses, a logical abstraction of these data, and an almost merciless deduction of results from demonstrable causes. His thesis for the doctorate dealt with percussion in childhood, and no one who has not read his text-book of clinical methods, which ran ever enlarging through seven editions, has properly realised to what extent the analysis of resonance can be relied on as a method of diagnosis. His habit was not to publish his original work in medical journals but to recite it to his students and ultimately to embody it in this text-book, and it annoyed him when one of his foreign colleagues asked what was his authority for this or that method which appeared in the book. His class teaching was lucid and piquant, whether he was dealing with the results of applying a hot fomentation or the principles of dietetics. One of his best remembered sayings is that only a certain amount of food can be taken and utilised by a human being during his lifetime; if he chooses to take it quickly his life will be short; if slowly his life will be correspondingly prolonged. It may be added that Sahli himself was a meagre eater. Of drink he used to point out with a twinkle that every animal which worked took stimulants, and left his audience to think out what he meant, adding that the dog who took none was the typical *Bummler.* Apart from his text-book, Sahli's studies of hæmophilia and of antibody formation were important. With the help of sphygmography and measurement of pulse-volume he never ceased in his effort to solve the problems of blood pressure; the chapters on this subject in his book amount to a monograph. He was one of the first to recognise the value of infusion with physiological salt solution, and it was he that introduced into modern therapy the use of the total alkaloids of opium in the form of pantopon (omnopon). But his standard was too high for any facile translation of principles into daily practice. *Aus nichts wird nichts, aus wenig wird wenig* was one of his favourite sayings, and none of his students learned to tread the path of clinical medicine with easy confidence. The picture which we reproduce[1] shows Sahli teaching in the theatre of his clinic. The date is about 1920.

MALARIA IN WEST AFRICA

ONE of the most remarkable features of endemic malaria on the west coast of Africa is the increase of certain infections during recent years, and especially the increase of quartan malaria (*Plasmodium malariæ*) among infants and children. R. M. Gordon and T. H. Davey,[2] who have lately examined children in Freetown (the capital of Sierra Leone), find that this rising incidence is being maintained and that quartan tends to become the predominant form of malaria in that city, although the subtertian parasite (*P. falciparum*) is still responsible for most of the infections among children under 3 years of age. In 1932, 37 per cent. of the children were found to be infected with quartan malaria and 25 per cent. with malignant tertian; whereas G. Macdonald in 1926 found 14 per cent. quartan and 57 per cent. malignant. Gordon and Davey have also estimated the density of the infective anophelines as a means of calculating the comparative risk of inoculation with malaria from each locality. They propose the following formula for the calculation of the anopheline infective ratio:

$$\frac{\text{Number of sporozoite-infected anophelines}}{\text{Number of female anophelines dissected}}$$

and they think this has advantages over the few formulæ previously suggested. The practical application is that a knowledge of the anopheline infective density makes it possible to estimate the relative importance of each species of anopheline vector in the district, and furthermore enables a comparison to be drawn between the relative infective densities of each district. The sanitarian can therefore concentrate his efforts on the district most urgently in need of attention. As the anopheline infective densities in West Africa change greatly with the seasons, it is advisable to base one's figures on the average of a year's observances. For instance, figures from one village in Sierra Leone for over 12 consecutive months show that in this locality the density during the wet season is 12 times as great as during the remaining six months of the year. Gordon and Davey have been able to prove that a close correlation exists between a high infective density and a high malaria rate amongst children examined during the first three months of their life, whilst a low infective density is similarly associated with a low infection rate. It is interesting to note that the age-incidence curve of malarial infection in 1932 follows very closely that described by D. B. Blacklock and R. M. Gordon in 1925. It is interesting, too, to consider the results of anti-anopheline measures in West Africa. Probably it is reasonable to suppose that a primary attack of malaria is more dangerous during the first few months of life than it is at a later, and therefore more resistant, age. In Freetown itself young children are rarely attacked by malaria during the first few months of life, whereas in other towns at least half of them are so infected. Whatever views may be held about the effect of anti-anopheline measures on the health of the native community, there can be no difference of opinion about its value in preserving the health of the European; for with personal prophylaxis he may now be able to ward off malaria indefinitely.

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[1] From Schw. Med. Jahrbuch, 1930. Basel: Benno Schwabe and Co.

[2] Ann. Trop. Med. and Parasitol., 1933, xxvii., 27 and 53.

DANGEROUS GASES AND VAPOURS

A YEAR ago a dustman removed a carbon dioxide cylinder from a house in Kent where medical practice had been conducted. Prospecting for scrap metal, he apparently handled the cap; it blew off and he died (under surgical operation) from consequent injuries of the abdomen. This is one of four gas cylinder accidents, resulting in deaths and non-fatal injuries, listed in a special appendix to the recent annual report of H.M. Inspectors of Explosives (Cmd. 4396, 9*d*.). Two of the four were cases of carbon dioxide explosion. The inspectors point out that carbon dioxide is not covered by the Gas Cylinders (Conveyance) Regulations of 1931 which deal with precautions for conveying by road the following gases in a compressed state: air, argon, carbon monoxide, coal-gas, hydrogen, methane, neon, nitrogen, and oxygen. Apart from the risks of conveyance by road there are obvious dangers in the handling of gas cylinders by inexpert persons, as in the Kent case, and legal liability might well attach to medical practitioners (or their executors) who allow these potential sources of injury to be accessible to members of the public.

The Gas Cylinders (Conveyance) Regulations are made under one of those statutory extensions in which draftsmen and departments delight. The Petroleum (Consolidation) Act of 1928 can be extended to other substances by Order in Council. Thus carbide of calcium (when carried by road) is petroleum because an Order in Council says so. The compressed gases enumerated in the Gas Cylinders (Conveyance) Regulations are petroleum for the same reason. As for petroleum-spirit proper the inspectors comment on the public ignorance of its dangers. People do not realise that the vapour, about two and a half times as heavy as air, will creep along the ground and may be ignited at a distance from the source of supply. Thus a naked light in an adjoining room may cause explosion; in one recorded case an oil-lamp 53 feet away ignited the vapour. The many instances of petroleum-spirit accidents notified to the inspectors and summarised in their report cover simple cases where persons have struck matches or used an oil-lamp to see if the fuel tank of a motor vehicle was full. Others are due to the spillage of petroleum-spirit on the hot exhaust or the electrical equipment, fatal injuries occurring where the occupant of an enclosed driver's cabin cannot escape from a burning lorry. A Wiltshire accident occurred through a spark from a Sentinel steam-wagon when petrol-tins were being filled from a pump. The casual cigarette caused death; in one case in Perthshire somebody lit a cigarette 30 feet away, but afterwards came and stood for a while at a distance of about 8 feet when ignition occurred. The inspectors' report has a special warning of the risks of domestic dry cleaning. Static electricity caused a fatal accident where a woman was washing a silk garment in petrol in the open air, away from any flame. To rub the fabric with the hands is quite sufficient to generate an electric spark. The inspectors strongly deprecate the hazardous operation of dry cleaning in the home "in spite of the hints that may be given in domestic journals from time to time on how to do it."

THE BLOOD FLUKE AND THE SNAIL

SINCE we last referred to the campaign against the blood fluke the uses of an old weapon have been more accurately defined and a new one seems to have been devised. As was noted in our last annotation [1] the drying of silt excavated from irrigation canals is being advocated as a means of destroying molluscs in the Gezira district of the north Sudan. It becomes clear that to dry it sufficiently to kill all snails may not be easy. Thus C. H. Barlow,[2] when crossing the desert to the Fayoum oasis south-west of Cairo, found the non-operculated snail *Eremena desertorum* stuck fast to stones almost too hot to handle; and yet when crushed these snails exuded from their shells wet and juicy. The question then arose in his mind whether the non-operculated carriers of schistosomiasis in Egypt, *Bullinus truncatus* and *Planorbis boissyi*, could survive drying in seemingly unfavourable conditions and thus carry on infection from one season to another over the six-weeks period during which the irrigation canals he tested were closed and allowed to dry. He found that they could, in substantiation of which two instances may be mentioned: some snails posted from Egypt to the United States arrived there alive; a lump of dried mud cracked open by a hammer disclosed a living planorbis. This resistance to drying is accompanied by retraction deep into the shell and the formation on the snail's surface there of an epiphragm, a silvery film of slime. As an additional protection bullinus orients itself so that the mouth of its shell lies downwards in mud, and without such protection it readily dies. The flat-whorled planorbis makes no such effort, but nevertheless is capable of survival over the six-weeks interval.

R. C. Archibald [3] reports that in the west and south Sudan molluscs are capable of æstivating for three to five months, surviving in the moist mud of watercourses and pools which until they dry form the sole water-supply for the Arabs of those parts. Moreover these people view with disfavour any chemical treatment of their water. It occurred to Archibald that could these places be forested with some tree whose dropped fruit made a fluid deadly to mollusc but harmless to man and beast, the difficulty would be met. Experiment showed that the date-like fruit of the tree *Balanites ægyptiaca* was fatal to all bilharzia-carrying molluscs. This tree, known locally as *heglig*, occurs throughout tropical Africa, Arabia, Egypt, and Palestine; it can fruit continuously for six months, and its ripe berries which have a bitter-sweet flavour are eaten with impunity particularly in the Upper Nile and Nuba districts.

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[1] THE LANCET, 1933, i., 96.

[2] Amer. Jour. Hyg., 1933, xvii., 724.

[3] Trans. Roy. Soc. Trop. Med. and Hyg., July, 1933, p. 207.

The active principle appears to be a saponin and to be distributed throughout the tree. The soaked and mashed berry in a strength of 1 in 6000 destroys not only snails but miracidia, cercariæ, tadpoles, and fish. If the tree were thickly planted round the ponds near villages it would serve, it is suggested, as a cheap and effective means of controlling schistosomiasis without impairing the potability of the water—a means whose usefulness might prove to have a wide geographical range.

A FRENCH PAPWORTH

ON Sunday, July 30th, a new and important contribution to the village settlement in the treatment of pulmonary tuberculosis was inaugurated at Salagnac, in the Dordogne. This venture, which has been sponsored by a voluntary organisation, the *Fédération Nationale des Blessés du Poumon,* and subsidised to the extent of 50 million francs by the French Government, is one of the most imposing schemes for the treatment of tuberculosis which have been launched in any country since the war. The site is imposing, and no stone has been left unturned in making the design up to date in every respect. Nor can it be said that the authorities have not explored well the ground already covered, for complete investigations of Papworth in Cambridgeshire and Preston Hall in Kent were made before the scheme was submitted to Mr. Edm. Miellet at the Pensions Ministry. Largely owing to the influential support of Prof. Léon Bernard, the French Government decided to proceed on lines similar to, but not by any means identical with, those in operation in this country. Accommodation has been provided for about 360 families; a large hostel is available for over 200 unmarried men; there is a separate unit for shops in which the villagers can make their ordinary purchases; a cinema, concert hall, playgrounds, open-air school, recreation grounds are all laid out ready for occupation in the near future. A section of the buildings is set apart for the active treatment of certain cases. It will however be some time before cases are admitted for permanent residence in any number, as there is still much structural work to be done. No elaborate arrangements have been made for workshops, and it is in this direction that the scheme differs most from our own settlements. It should be remembered that all the men admitted will be pensioners, to whom the need for remunerative occupation is of less importance than residence in a hygienic community under medical supervision, and the hope is expressed by those in authority that occupations like printing and woodwork will develop as time goes on. Just how far a scheme of this kind will be successful remains to be seen; the conditions certainly are ideal for treatment.

RADIUM THERAPY IN EYE DISEASE.

EXPERIENCE has been gained in the treatment of two forms of malignant intra-ocular tumour by radium—namely, glioma and sarcoma. Glioma of the retina is a disease of infancy and frequently attacks the two eyes, one after the other, and hitherto enucleation has been the sole recognised treatment. To avoid the sacrifice of an only eye with still remaining sight affords an opportunity for the experimental treatment by radium. Mr. H. B. Stallard records[1] five cases where this has been carried out either at St. Bartholomew's Hospital or at Moorfields. The first case was that of a child whose left eye had been excised for glioma at the age of 5 months in 1925. In 1929 a glioma was discovered in the upper nasal quadrant of the right eye, and on Nov. 15th, 1929, the child being 5 years old, a radon seed of 3 millicurie strength was inserted into the neoplasm through a scleral incision. By Nov. 26th the whole neoplasm had shrunk. The seed was removed and the child re-examined at frequent intervals. On July 6th, 1930, a recurrence was feared and another radon seed was inserted through the hole made by the former seed and left in for a week, but from subsequent experience this was believed to have been unnecessary. In March, 1931, a local recurrence was again feared, and four radon seeds were sutured to the sclera around the site of the previous hole and covered by the conjunctival flap; they were removed on the eleventh day. Subsequently there was some papillœdema with retinal exudate and hæmorrhages. As intracranial extension was feared the patient was readmitted for deep X ray therapy to the back of the orbit and floor of the skull. By November, 1932, his vision had improved to 6/12 (one better), and there was no evidence of recurrence of the tumour. Mr. Stallard's conclusion is that the destruction of the glioma may have been attained at the first operation and that the subsequent measures adopted were unnecessary or even harmful. In the second case, also one of bilateral glioma in an infant, the second eye was treated with radon seeds and at the last insertion the thread attached to the radon seed was brought through the conjunctiva instead of being buried beneath it; to this was attributed a panophthalmitis which spoiled the case. In the third and fourth cases the eye had to be excised, but there was pathological evidence of arrest of the growth. The fifth was too recent for any conclusions to be drawn from it.

Three cases of sarcoma of the choroid were treated with radium. In the first, a man of 65 with the second eye blind, the growth shrank, and three and a half years later there was no clinical evidence of increase of size, extra-ocular extension, or metastatic deposits. In the other two there was partial destruction of the neoplasm, but the eye had to be excised. In two cases of sarcoma of the iris the external application of radium through the closed lids appeared to have been successful in reducing the size of the growth after 18 months. In a second case it was unsuccessful and the tumour was removed by iridectomy; in a third the diagnosis was doubtful. Comparing these results with those previously recorded, the author comes to the following conclusions. Glioma retinæ and sarcoma of the uveal tract are radiosensitive, the cells are destroyed by radium emanations, and the zone of destruction varies with the strength of the seed. The best method of application is the interstitial insertion of the seed into the neoplasm. The suturing of radon seeds to the sclera and other methods of application are less effective, if effective at all, and are likely to produce injury to the eye. In a case of angiomatosis retinæ, however, the suturing of radon seeds over the site of the growth did bring about obliterative endarteritis in the dilated and tortuous vessels passing to the neoplasm and apparently arrested its growth.

In addition to these cases of intra-ocular tumour, 12 cases of malignant epibulbar growth, treated by radium and collected from various sources, are reported. Of these, nine showed satisfactory results at periods varying from 16 months to 10 years after treatment. All but one of these cases were treated at the Radium Institute where unscreened radium contained in plates of monel metal was used, application being made by direct contact to the neoplasm, and retained in position by hand. Of six cases of malignant neoplasms of the orbit, either primary or occurring after excision of the affected eye, four did well. Malignant neoplasms affecting the bony walls of the orbit are exceedingly difficult to treat with radium, which is rarely successful. The foregoing are the principal types of case in which radium treatment may be applicable to ocular disease. In rodent ulcer of the lid it has been extensively used, but the results are bad in cases of deep ulceration. Various cases of non-malignant disease have been treated, especially spring catarrh, but the results are not convincing. In some cases of hæmiangiomata of the lids, conjunctiva, and caruncle, however, the results are remarkably good. Mr. Stallard ends by stating his belief that in the present state of our knowledge radiotherapy for diseases of the eye should not be undertaken lightly. Irradiation cataract, corneal necrosis, and panophthalmitis are among the possible dangers, added to which there is the ever-present risk of damage to the operator.

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[1] Gifford Edmonds prize essay for 1932, reprinted from the British Journal of Ophthalmology.

THE HÆMOLYTIC ANÆMIAS OF INFANCY

THE group of hæmolytic anæmias has been described as the most unsatisfactory waste-paper basket in medicine to-day. Prof. Leonard Parsons and Dr. J. C. Hawksley,[1] who have been studying anæmias of infancy and early childhood, suggest that erythronoclastic is a better term than hæmolytic, since it includes conditions in which the bone-marrow or other hæmopoietic tissue is injured as well as those in which red cells are supposed to be destroyed in the blood stream. The erythron, as Prof. Parsons explained in the discussion reported on p. 418, is Boycott's name for a tissue comprising not only the red cells in the blood stream, but also their precursors in the blood-forming organs[2]; thus disorders affecting the platelets and myeloid elements would also be included as erythronoclastic. They divide the erythronoclastic anæmias into two groups—those occurring in the early weeks of life (the neonatal group) and those developing later. Those of the neonatal period have been recently analysed in great detail by Diamond, Blackfan, and Baty as erythroblastosis fœtalis, which includes hydrops fœtalis, icterus gravis neonatorum, and anæmia of the new-born. Parsons and Hawksley believe that the peculiar changes found at autopsy in these conditions depend on a response to blood destruction, rather than the cause of the anæmia as is suggested by the American workers. The anæmias of their second group they classify as (1) acute hæmolytic (Lederer type); (2) subacute hæmolytic; and (3) subchronic hæmolytic. They are anxious to substitute the term subchronic hæmolytic anæmia for "von Jaksch's anæmia." The nature of this mysterious disease, whose very existence is now denied by most hæmatologists, they discuss in detail, but their conclusions are based upon an analysis of a small group of cases with no post-mortem reports. They believe that it is a definite clinical entity dependent upon a process of chronic hæmolysis of unknown causation. But the evidence that hæmolysis was present in some instances was an excess of urobilinogen in the urine and signs of active bone-marrow regeneration in the peripheral blood, and many readers will think it inadequate. Parsons and Hawksley's papers also contain brief mention of acholuric jaundice, the erythroblastic anæmia of Cooley, sickle-cell anæmia, and anæmia associated with cœliac disease. They are illustrated throughout with case reports which will certainly prove of value to future workers. The importance of transfusions in the treatment of obscure infantile anæmias is well demonstrated.

THE WILL TO RECOVERY

SPORT is being closely studied by medical men in present-day Germany. Last year Prof. H. Herxheimer, of Berlin, published a "Grundriss der Sportmedizin" for doctors and students, dealing exhaustively with the literature of the subject. In this book[1] he set out the physiological principles, beginning with the immediate effect of sport on the body as a whole, continuing with the circulation and respiration, external and internal, as well as the metabolic changes and adaptations, passing on to the later effects of such exercises on organs and functions, including the mechanism of training. In a special number of the *Deutsche Medizinische Wochenschrift* (August 11th), devoted to "Arzt und Sport," Prof. W. Knoll, of Hamburg, has an interesting paper on the increasing tendency of joints to injury during sport as age increases. Epithelium, fibrous tissue, and even bone have fair ability to regenerate; it is less so with muscle and tendon, and least with cartilage. He finds that the little unobserved traumas, especially those of football and boxing, tend to summation, as a rule without the patient being aware of them, until a definite stage of deforming arthrosis has been reached. The accidental discovery may then be a surprise to its possessor who has suffered no disability from it. The ankle seems to be most often affected—then the knee and the elbow; generally there are peri-articular exostoses, the result, he believes, of small subperiosteal bleedings, due to traction on capsule and ligaments. Knoll lays much stress on the fact that these injuries so often produce no effect on athletic capacity. Especially is this so in the case of the elbow, the reason being, as he says, that sport is a pleasure-linked experience; and it is quite another matter when the same injury arises in the course of work. Where there is no will to recovery the human being who is thrown out of work through an accident often does not find his way back again. Against this exaggeration of the results of injuries, especially to the joints, Knoll would like to see energetic measures taken; and "the sportsman," he adds, "has shown us the way"; for athletic experience indicates in how high a grade the results of accident can be compensated by some adaptation to work.

THE British Association begins its annual meeting at Leicester on Wednesday, Sept. 6th, under the presidency of Sir Gowland Hopkins, F.R.C.P., P.R.S.

AT the end of June Parliament passed the Act which reorganises membership of the Pharmaceutical Society and rewrites the law of poisons. These changes were not to operate till dates appointed by Order in Council. The first Order in Council has now been made. In effect the Poisons Board will be established, and the preparation of the Poisons List will begin, on Oct. 1st. The Privy Council will on that date be able to make its nominations to the Society's Council, but the changes in the Society's membership will not operate till Dec. 31st, when the arrangements for the new Statutory Committee will also come into existence.

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[1] Arch. Dis. Child., 1933, viii., 159, 184.
[2] THE LANCET, 1929, ii., 819, 883.

[1] Leipzig: Georg Thieme. Pp. 177.

SPECIAL ARTICLES

SCREW-CAPPED BOTTLES
IN THE PREPARATION AND STORAGE OF CULTURE MEDIA

BY J. E. McCARTNEY, M.D., D.Sc. EDIN.
DIRECTOR OF RESEARCH AND PATHOLOGICAL SERVICES, LONDON COUNTY COUNCIL

(*From the Southern Group Laboratory, Park Hospital*)

IN the London County Council the Pathological Service is made up of a number of group laboratories each serving a group of hospitals. Each group laboratory is located at one of the hospitals in the group, and consists of a completely equipped laboratory staffed by a pathologist, assistant pathologist, and technicians. The other hospitals in the groups have small laboratories, staffed by a technician only, in which the simpler pathological examinations are carried out. The remainder of the specimens are sent to the group laboratory, and the pathologist acts as consultant to the hospitals of his group and supervises the work of the hospital laboratory technicians.

Most of the commoner media for the routine examinations, except Löffler's serum, are made at the Southern Group Laboratory, Park Hospital, and distributed both to group laboratories and hospital laboratories. This is an extension of the system of the late Metropolitan Asylums Board, whereby the Southern Group Laboratory supplied media (except Löffler's serum), made-up stains, &c., to the Board's fever, tuberculosis, and children's hospitals (now the Special Hospitals Division of the L.C.C.), and the mental hospitals. Under the London County Council with its 29 general hospitals, united with the Special Hospitals Division, the manufacture and distribution of culture media has been considerably extended. Problems of manufacture on a large scale, distribution into containers, storage, and supply to the numerous hospitals have had to be met, and the methods used are here described.

The ordinary method of storing media in flasks with cotton-wool or rubber stoppers is obviously out of the question. When cotton-wool stoppers are used the culture medium evaporates, moulds may enter, and dust collects. If the stopper is covered with parchment or paper, the dust on the cotton-wool is avoided, but drying still takes place. If rubber stoppers are used the medium cannot be sterilised with the stopper in the flask, since the heat would cause the stopper to be ejected or the flask would burst owing to pressure. The rubber stopper has therefore to be sterilised separately and placed in the flask when the medium is cooled, thereby allowing the chance of contamination during the process. During storage or transit dust may collect in the angle between the rim of the flask and the rubber stopper, so that when the stopper is removed dust will inevitably fall into the medium. Flasks are awkward to store and difficult to transport, and the necks vary in size. Moreover, they are costly.

"CANNED MEDIA"

The use of plain flat commercial medicine bottles with screw caps has made possible the adoption of what, for want of a better name, I have termed the "canned media principle." Essentially it consists of placing the medium in a container, which is then hermetically sealed and thereafter sterilised. The result is that the container, being completely closed, remains sterile indefinitely in exactly the same way as the canned goods of domestic use. There is no chance of contamination, no leakage, no necessity to store in a cold room, while transport is much more easily accomplished. By adopting this principle it is possible to prepare media in large quantities centrally and distribute it in amounts of 100–500 c.cm. to the various laboratories. This obviates each laboratory having to make comparatively small quantities for its own consumption, and allows an adequate amount of media to be kept in stock both centrally and in the various laboratories. Moreover, it permits the employment of carefully prepared standard products throughout the Pathological Service. When required for use the medium is distributed into tubes or Petri dishes at the individual laboratories.

Screw-capped plain "medical flats" made by the United Glass Bottle Manufacturers Ltd., are employed. Their use for blood culture bottles has already been described.[1] These bottles are supplied in various sizes ranging from 1 oz. to 20 oz., but the sizes most commonly used are 4 oz., 6 oz., 12 oz., and 20 oz., in which are placed 50, 100, 250, and 500 c.cm. of media respectively. The bottles are the same shape as ordinary medicine bottles, but have no graduations or markings on them. They are of clear white flint glass and the neck has an external screw thread. The screw caps are made of aluminium sprayed with white cellulose paint, and the washer is made of composition cork. The bottles are received from the manufacturers already cleaned, washed, capped, and sterilised, so that they require no further treatment before use. This is a great boon as the other bottles previously employed were received packed in straw, and all the elaborate cleaning of unused glassware had to be undertaken.

When the medical flats were first used it was found that on removing the cap to pour out the culture medium, the composition cork washer sometimes adhered to the lip of the bottle instead of remaining inside the cap. This was overcome by using a disc of "Blackol"—a smooth black-enamelled paper—as a liner to the composition cork washer.

The medical flats can be autoclaved with the cap tightly screwed on, either empty or containing media, with little fear of breakage. Very occasionally a bottle may break, but the number is less than 1 per cent. Care must be taken that the bottles are placed in the steriliser loosely and not packed tight in a wire crate or other container, otherwise breakages will inevitably occur.

Solid media such as nutrient agar or MacConkey's medium are not stored in quantities larger than 250 c.cm., owing to the time required for melting the media. It should especially be noted that the flat shape of bottle permits of much more rapid melting than with the round bottle, flasks, or large tubes. The 250 c.cm. of agar is melted after 20 minutes in the steamer. With fluid media such as broth or peptone water 500 c.cm. is the largest amount bottled.

A great advantage of the screw-capped bottles is that when the agar is melted, various enriching substances can be added and thoroughly incorporated. Thus in making blood-agar, 100 c.cm. of agar is melted, cooled to 50° C., and 10 c.cm. of defibrinated horse blood (stored in 1 oz. screw-capped bottles) is added. The screw-cap is replaced and the bottle inverted several times so that complete mixing of the blood and agar takes place. Owing to the fact that the screw-cap completely covers the top of the bottle there is no chance of dust collecting on the lip of the bottle and the contents can be poured into Petri dishes without any fear of contamination. Any air bubbles on the surface of the agar are removed by drawing the flame of a bunsen burner quickly over the surface of the medium.

When a culture medium is prepared at the Southern Group Laboratory its ultimate container is known, and it is bottled direct into its appropriate bottle and receives its one and only sterilisation in that bottle. Thus, if 50 litres of nutrient agar are prepared, it is distributed immediately after filtration, and while still fluid, into say 300 6-oz. bottles each containing 100 c.cm. (30 litres), and into 80 12-oz. bottles each containing 250 c.cm. (20 litres). The screw-caps are then put on the bottles, and the whole batch of bottles is sterilised immediately afterwards in the autoclave. The agar thus receives only one sterilisation and excessive heating is thereby avoided. Similarly, broth is distributed as soon as made into its ultimate containers, and where the medium is used or sent out in tubes, the tubes are filled with the filtered agar or broth immediately after being made, and each tube of medium receives therefore only one sterilisation.

The agar is filtered through sand and paper pulp at the rate of about 20 litres an hour, and a batch of 30 litres can be filtered, bottled, sterilised, and stored away by two technicians in an afternoon. Amounts up to 50 litres an hour can be filtered, but the rate of 20 litres an hour is fast enough to keep two technicians busy.

The filling of the bottles is done by means of a semi-automatic device in the case of the 100 and 250 c.cm. amounts. With tubes the Ayling filler[2] is used, and a technician can add amounts of 5 c.cm. into tubes at the rate of 16 dozen in 10 minutes. The tubes are not sterilised before being filled but are merely clean and dry after being washed. After the required amount of medium has been added they are plugged with non-absorbent cotton-wool stoppers and sterilised. Instead of the ordinary roll of cotton-wool being used, the best quality non-absorbent wool is obtained in the form of a long thin ribbon known as "rope wool," and is of the type used by hairdressers.

When blood culture bottles are used[1] perforated caps with a rubber washer and blackol liner are used and immediately after sterilisation the appropriate coloured viskap is slipped over the top of the bottle.

IDENTIFICATION OF MEDIA

Coloured beads are used in order to identify the various bottled media and to avoid the use of gummed labels which may peel off or become detached in the steamer when a solid medium melted. These are the ordinary opaque beads for threading necklaces, 7 mm. in diameter, and cost about 30 a penny. The clear glass beads are not suitable. They are first treated in a 1 per cent. solution of commercial hydrochloric acid, well washed with tap water, then distilled water, and finally dried in the oven. The appropriate bead is dropped into the bottle before filling. Owing to the curve at the bottom of the bottle the bead remains in one corner and is very easily recognised no matter what type of culture medium is used. On tilting the bottle for pouring, the bead comes to rest on the shoulder and remains in the bottle, even when the bottle is tilted vertically. The coloured beads can be used for identification of all kinds of media and reagents. The colours employed are as tabulated above, and it is suggested that these become standardised.

Identification Colours

Culture medium.	Colour of bead.
Digest broth	Black.
Nutrient agar made from digest broth	Black.
Infusion broth	Yellow.
Nutrient agar made from infusion broth	Yellow.
MacConkey's medium	Red.*
Peptone water without indicator ..	White.
Peptone water with indicator ..	Brown.
Glucose media	Green.
Other solutions, &c.	
Distilled water	White.
Normal saline	Dark blue.
Carbol saline	Light blue.

With blood culture bottles,[1] in addition to the coloured viskaps, a bead is added so that when the bottle is returned to the laboratory the exact medium may be identified if the viskap has been entirely removed.

Blood Culture Bottles

Culture medium.	Colour of bead.
Plain broth	White.
,, ,, with glucose	Green.
,, ,, with sodium citrate ..	Purple.
,, ,, with bile salt	Yellow.

The use of these coloured beads for identification purposes is very convenient, and has saved much labelling. It can be recommended for general laboratory use.

A SUBSTITUTE FOR TEST-TUBES

Hitherto the various culture media have been finally distributed into test-tubes with cotton-wool stoppers or Petri dishes. The use of chemical glassware such as test-tubes and flasks for bacteriological purposes is a survival from the early days of bacteriology when the only containers available were chemical glass-ware. These have remained up to the present day in spite of their many undesirable features.

The use of the test-tube has certain disadvantages. The cotton-wool stopper does not prevent contaminating organisms from reaching the medium. The open nature of the stopper allows of rapid drying of the surface. Dust is apt to collect in the angle between the top of the tube and the cotton-wool stopper in the same way as it collects between the top of a bottle and the cork. When the cotton-wool stopper is removed before inoculation of the medium, the dust may drop into the tube and cause contamination. The rounded bottom of the test-tube necessitates the use of a stand or tin container. The dimensions of test-tubes of a stated size vary very considerably, so that each one has to be individually placed in the sloped position if uniform slopes of medium are to be obtained. Moreover, test-tubes when purchased are unwashed, are often packed in straw, and are contaminated with the spores of *Bacillus subtilis*. They have to be thoroughly cleaned, treated with acid, washed with water, and efficiently sterilised before being put into use. This process is time-consuming and involves a fair amount of expense, added to which breakages during washing and manipulation often occur, as test-tubes are somewhat fragile.

In my opinion it is the drying of the medium which is the greatest objection.

A culture medium of a definite composition is prepared and tubed. As a result of drying the proportion of its solid ingredients is increased; the salt content is higher, and soon the medium becomes much less suitable for growth, particularly of delicate organisms. The evaporation may be such that the worker realises the composition of the medium is altered and discards the remainder of the tubes.

All workers have experienced this with culture media containing the rarer sugars, necessitating fresh media being prepared and consequent delay. Even more ndesirable is the drying of solid media such as agar lopes or Löffler's medium. Here it is the surface layer hat becomes desiccated, and, whereas the underlying nedium may be moist, the actual surface on which the rganisms grow may be distinctly dry. Obviously the omposition of the medium actually at the surface, and vhich is to sustain growth, is quite different than when reshly made, and in consequence a much less satisfactory ulture medium results. Water is an essential requirenent for bacteria, but the surface film of partially solid lried culture media must contain very little. I have requently had sent to me swab smears on partially dried Löffler medium which allowed of no growth whatsoever.

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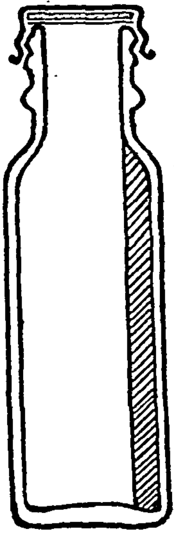
* When MacConkey's medium is stored for any length of time the neutral red indicator tends to fade. In order to overcome this the medium is made up in the usual way, but without neutral red, and the pH is adjusted so that the correct shade of colour is obtained when the indicator is added. The MacConkey agar without indicator is indistinguishable from ordinary nutrient agar, but is identified by its red bead. The neutral red is put up in a 2 per cent. alcoholic solution and 0·3 c.cm. per 100 c.cm. of medium is the average quantity used. When plates are to be poured the bottle of MacConkey agar is melted, the indicator added, the screw-cap replaced, and the contents thoroughly mixed before pouring.



Section of the small, round, screw-cap bottle which takes the place of the test-tube. The shaded area shows the position of the medium for a slope culture. (The actual bottle is about 3½ inches high.)

If a medium can be used soon after it is made, and drying can be prevented, then its use is satisfactory, but where small laboratories, operating theatres, medical centres, &c., have to keep stocks of various media in case of need, then drying is inevitable. Either the medium becomes unsatisfactory for growth, or it becomes obviously dry and has to be discarded. In warm or tropical climates, and in the summer months in this country, the drying of culture media presents a really serious problem.

In order to overcome the disadvantages of the test-tube I have applied the "canned media" principle to smaller quantities of material. One-ounce screw-capped bottles made of white flint glass are used. They are supplied by the United Glass Bottle Manufacturers Ltd. The shape and size are indicated in the accompanying Figure. The size of cap is the same as the 6 oz. medical flat bottle previously described, and which is used for storing agar in 100 c.cm. amounts, and for my blood culture bottles. The cap is made of aluminium, sprayed white, and has a composition cork washer and a "blackol" liner. The latter is necessary to avoid adhesions of the washer to the mouth of the bottle and prevent the contents actually from touching the cork composition. The bottles are supplied cleaned, washed, capped, and sterilised, so that no further treatment is necessary before placing in the culture medium. The cost is no more than that of test-tubes, while the expense of treating and washing the latter is avoided.

If agar slopes are required the method is as follows:—

As soon as the bulk agar is filtered, and while still fluid, 5 c.cm. amounts are placed in each bottle by means of an Ayling filler.[2] The caps are tightly screwed on, and the bottles and contents sterilised in the steamer or autoclave. The bottles are then merely laid on the table and the amount of agar is such that the surface is level with the shoulder, and no sloping whatsoever is required (see Figure). When the agar is solid the bottles are packed in dozens in cardboard boxes, and can be stored indefinitely. As the bottle is tightly sealed, there can be no evaporation or ingress of contaminating organisms.

The bottles can be sent by post, can be stored in any position, and being very strong are not easily broken. The water of condensation remains always in the bottle and the surface is moist. When ready for inoculation the cap is unscrewed and it should be noted that the lip of the bottle has been in contact with the washer all the time during sterilisation and storage, and is therefore sterile. There is no chance of contamination from dust. From the sketch it will be seen that the platinum wire enters the bottle level with the surface of the medium, and the whole surface can be reached and utilised. With the ordinary test-tube slope the upper third is usually dry and not utilised, while the thin layers on the sides of the slope are also dried and are either not used or yield a poor growth. With the screw-capped bottles, however, the whole surface is moist and of the same composition, while the same amount of agar (5 c.cm.) gives a larger surface in the bottle than in the usual 6 in. × $\frac{5}{8}$ in. test-tube. When the inoculation is finished the cap is replaced, and the bottle can be stood upright on the bench or in the incubator, avoiding the use of a test-tube rack or tin. This is very useful in small laboratories, or in wards, schools, &c., when cultures have to be made, and where often no racks or tins are available.

During incubation no evaporation takes place. Experiments have shown that the oxygen available is ample even for strict aerobes. The capacity of the bottle is 30 c.cm., of which 5 c.cm. is taken by the medium. Of the remaining 25 c.cm. of air, 5 c.cm. consists of oxygen which is ample for all cultural requirements. The difference of the growths on the same batch of agar, in the small screw-capped bottles, and in test-tubes which have been stored a few days, is quite marked. Hæmolytic streptococci and pneumococci grow profusely on ordinary agar in the screw-capped bottles, while staphylococci and the coli-typhoid group show marked growths after a short period of incubation.

When the small bottles have been used for media, they are cleaned in the ordinary way like test-tubes. The screw-caps are thrown away and new caps and liners are fitted to the bottle when it is used again.

MEDIA DISTRIBUTED IN SMALL BOTTLES

The screw-capped bottles are used for the following media :—

(1) *Broth*, especially useful for small laboratories, operating theatres, and for transit to other laboratories.

(2) *Nutrient agar*.—(*a*) In stabs of 12 c.cm., which are very useful for making plate cultures. (*b*) As slopes. The details have already been described, but in addition it is very convenient to put up serum-agar and blood-agar slopes in this manner. When properly prepared the serum-agar slopes will keep indefinitely, while the blood-agar slope retains its characteristic appearance for about two weeks. After that time it begins to darken in colour, but its capacity for growing delicate organisms is in no way impaired.

(3) *Gelatin*, especially as it is not in frequent use. During growth of the organism the surface of the gelatin stab does not dry.

(4) *Löffler's serum*.—This is most useful in schools, clinics, small hospitals, &c., where cultures are only made from time to time. The serum-glucose-broth mixture is introduced into the bottles, which are capped, laid flat in the inspissator, and heated for the requisite time for coagulation to occur. The culture medium should be allowed to cool before being handled. The medium thus prepared keeps indefinitely and gives a very profuse growth after incubation for a few hours. The bottle can be sent to the laboratory without any fear of contamination or breakage.

(5) *Sugar media*.—It is particularly useful for this purpose. Small stocks of rare sugars can be stored indefinitely without deterioration, while media with the ordinary sugars can be sent by post or similar means. There is no possibility of leaking or spilling.

Sugars are put up (*a*) in peptone water with a fermentation tube ; (*b*) in Hiss's serum water.

With the fermentation tubes air may enter the Durham tube as a result of shaking during transit, but it is easily removed. The bottle is merely inverted, the Durham tube drops into the neck of the bottle, and the amount of fluid is such that the open end of the tube is below the surface. The bubble of air escapes and on turning the bottle to the proper position the Durham tube falls to the bottom of the bottle full of liquid and without any air.

In order to identify the various sugar media the caps are painted with "Luc" cellulose paint, of which many colours are available. The screw-caps, as received from the makers, are already sprayed white, and these are equivalent to white cotton-wool stoppers. The colours on the tops of the small screw-capped bottles indicate the same sugars as the coloured cotton-wool plugs. Thus, in the L.C.C. Laboratories green=glucose, red=lactose, mauve=mannite, &c.

After a batch of bottles has been prepared, the appropriate colour is painted on the tops of the bottles. A batch of a gross takes only a few minutes to do, and the paint is dry within 30 minutes. When two colours are used together for identifying media—e.g., yellow and white for inulin—only one-half of the white cap is painted.

With sugar media, the carbohydrate is not added to the remainder of the medium before sterilisation, as hydrolysis may take place and alter the composition of the particular sugar. In order to avoid this, the medium without the sugar is sterilised in the ordinary way, and afterwards the particular carbohydrate is added in the form of a 10 per cent. sterile aqueous solution. The sugar solution is sterilised by filtration through a Seitz filter, and the method for doing this (also utilising screw-capped bottles) has already been described in detail.[3] It is of great advantage to prepare a quantity of small screw-capped bottles containing peptone water, indicator, and fermentation tube, but without adding any carbohydrate. The caps are screwed on tightly and the bottles sterilised. They will remain sterile indefinitely. When a batch of a particular sugar medium is required, the appropriate amount of the 10 per cent. sugar solution is added. The caps are then painted with the appropriate colour denoting the sugar. By this method small quantities of any sugar medium can be made at a moment's notice. In the case of the more expensive sugars, or those rarely used, the sterile sugar solution can be stored in the small screw-capped bottle fitted with a perforated cap and rubber washer, similar to the blood culture bottle previously described.[1] When the sugar solution is required it is withdrawn from the bottle by perforating the rubber with the needle of a sterile syringe in exactly the same manner as with a rubber-capped vaccine bottle.

The same procedure is suitable also with Hiss's serum water.

(6) *Media for growing the tubercle bacillus.*—The small screw-capped bottle is especially useful for Dorset's egg medium and its modifications, Petroff's medium, Löwenstein's medium, &c. The system enables the medium always to be moist, prevents the messy sealing of the culture tubes, and permits easy access to the culture media. I have obtained very profuse primary growths of tubercle bacilli from sputa with a modification of Löwenstein's medium in the small screw-capped bottles.

(7) *Cooked meat medium.*—The screw-capped bottles are very useful where stock cultures are kept in this medium. No covering of liquid paraffin is necessary as no evaporation takes place, while no dust or contaminating organisms can enter. Similarly, cultures of the anaerobes are equally successful in this container.

In addition to culture media, supplies of serum and defibrinated horse blood are stored and supplied in 10 c.cm. amounts in these containers. The serum keeps indefinitely, while the defibrinated horse blood keeps for about six weeks in the cold room without laking.

OTHER USES OF THE BOTTLES

Screw-capped bottles are used for other laboratory purposes, and their use has almost entirely superseded that of "scientific" glass-ware. Their use for filtering sugars, toxins, sera, &c., has already been described.[3]

For sending specimens to the laboratory a special screw-capped bottle is used. It is of the same capacity as the 1 oz. media bottle figured here, but it has no shoulder, the sides being practically parallel. The mouth is much wider, while the cap is considerably larger. These bottles, known as universal containers, are used throughout the L.C.C. Pathological Service for sending blood, urine, pus, cerebro-spinal fluid, fluids, &c., to the laboratory. A small piece of metal with one end bent over is supplied separately and used as a fæces spoon. Its size is such that after the sample of fæces has been taken up in the bent end, the whole "spoon" is placed into the bottle and the cap screwed on. The screw-capped specimen containers have entirely replaced the ordinary glass specimen tube with cork or rubber stoppers. During the last three years not a single breakage has occurred during postal or other means of transit.

For sending tissues for histological examination to the laboratory, wide neck screw-capped "pomade pots" with aluminium screw-caps are used. These are sent to the various hospitals containing about 35 c.cm. of 10 per cent. formal saline.

SUMMARY

Methods used in the preparation of culture media in the London County Council Pathological Service are described. The use of screw-capped bottles has very much simplified the preparation, storage, and distribution of culture media. The adoption of the "canned media principle" whereby the culture medium is sterilised in a hermetically sealed receptacle has been made possible. Small screw-capped bottles replace test-tubes, and in them the culture medium remains sterile indefinitely, and drying does not take place. They are of considerable value in small institutions, operating theatres, schools, &c., where culture medium is only used occasionally. The use of coloured glass beads for the identification of culture media and other laboratory preparations is described.

I wish to acknowledge the invaluable assistance which my senior laboratory technician, Mr. T. H. Ayling, has rendered me in the development of the methods here described.

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MEDICINE AND THE LAW

A Sunday Inquest

THE mid-Worcestershire coroner made history when he held an inquest on Sunday, August 6th, on the death of a young man drowned while bathing in the Severn. The coroner is reported to have deemed it essential that the inquest should take place at once, but two reasons he gave for holding his court on a Sunday are inconclusive. He said he doubted if he could compel the attendance of witnesses on the following day as it was a bank holiday. Inquests on bank holidays, however, are neither unknown nor irregular; one was held, as it happens, at Leigh in Lancashire, on August 7th; if any doubt exists of the power to summon witnesses to attend on the Monday, there is vastly more doubt about fetching them to a court on Sunday. In the second place the coroner observed that the relatives had consented. If, however, an inquest is invalid and illegal, members of the public cannot by waiving their power of objection (whatever that may be) validate and legalise the proceedings. Sunday is a *dies non juridicus;* no judicial act must be done that day; although certain ministerial acts may be permissible, nobody will suggest that holding an inquest is a ministerial rather than a judicial act. It may be true that, if the inquest showed that the unfortunate death of the young man drowned in the Severn was not due to either suicide or criminal conduct but merely to misadventure, nobody will have any interest or desire to move to quash the inquisition for irregularity. Coroners nevertheless will not endorse the theory that, the result of an inquest being nugatory, they can either keep the law or break it as they choose.

The text-books send us back to Mackalley's case on this question of judicial acts on Sunday. In 1611 somebody killed a serjeant of the mace in London, and the courts had to say whether a consequent arrest upon a Sunday was valid. Coke, reporting the case, sets out the objection that, if Sunday is not *dies juridicus*, no arrest could be made thereon. "It is the sabbath," he remarks with the piety of his age, "and therefore thereon everyone ought to abstain from secular affairs for the better worship and service of God in spirit and truth." The court, he says, answered and resolved that "no judicial act ought to be done on that day, but ministerial acts may be lawfully executed on the Sunday for otherwise peradventure they can never be executed, and God permits things of necessity to be done that day and Christ says in the Gospel, *bonum est benefacere in Sabbatho.*" There are other quaint cases in the black-letter law books, but better guidance is to be found in the modern decision of Winsor *v.* the Queen (1865). Baron Channell began to try two women at Exeter on a Friday morning, thinking the trial would be finished by Saturday evening. The jury deliberated for five hours and came back into court a few minutes before twelve on Saturday night to say they were not agreed and were not likely to be. The judge was in a difficulty. The Lord's day was at hand; the assizes had to open in Cornwall on the Monday. Was he to wait and give the jury more time to deliberate, as if it were a week-day? If the jury then returned a verdict on the Sunday would it be legal? When the proceedings came up on a writ of error, Blackburn, J., declined to answer those questions as they did not in fact arise. "But," he said, "I do not think there can be the smallest doubt that to sit judicially on Sunday on any business would be indecent and improper, and ought never to be done if it can be helped; that much no one can doubt. It is upon the authorities a matter of the gravest doubt whether a verdict taken on Sunday would not be void in point of law, so that in a court of error" [nowadays the Court of Criminal Appeal] "a conviction might be set aside." Mellor, J., agreed; for a judge to sit on a Sunday would be improper if it could be helped; he inclined to think the verdict of the jury could not be taken on a Sunday. In R. *v.* Ramsay (1867) it was held that, where magistrates have to take sureties and to commit persons to prison in default, these are judicial acts which cannot be done on a Sunday. In the face of these comparatively recent rulings a coroner who chooses to sit on a Sunday runs the gravest risk of illegality. According to the dictum in Winsor *v.* the Queen, such action is "indecent and improper," though the vigour of these words is modified by the accompanying statement that "it ought never to be done if it can be helped." Apparently what the judges had in mind in this modification was that, if Baron Channell had got his Exeter jury to find a definite verdict at a few minutes past midnight, the resultant irregularity might conceivably have been condoned under the legal maxim *quod fieri non debet factum valet.* To take a verdict on a Sunday is one of the things which ought not to be done; yet, if done, it might have stood in the circumstances. Baron Channell properly and reasonably began to try Charlotte Winsor at Exeter that Friday morning. There might have been all the difference in the world between finishing a case in emergency a few minutes after midnight on the Saturday and beginning to try a case on the Sunday.

Fees for Attending Medical Practitioner

The Court of Session in Scotland delivered last month an interesting decision upon the claim of a doctor for fees for attending a member of the same profession. The late Dr. John Reid, for many years in practice in Preston, retired in 1924 at the age of 72 to a small estate in Argyllshire. His health was then feeble; in 1929 he collapsed one day at Oban and from that time to his death in 1931 he was almost entirely confined to his house. He was attended on 71 occasions between August, 1929, and his death by Dr. D. G. MacArthur of Barbreck, Argyllshire, who claimed from the executors the sum of £447 6*s.* as fees for medical attendance. Apparently no account was rendered for fees until after Dr. Reid's death; in the circumstances the Union Bank of Scotland (as executors for Dr. Reid) disputed Dr. MacArthur's obviously substantial claim. Some of the bank's contentions were possibly intended merely to put Dr. MacArthur to the formal proof of his figures. The bank said, for instance, that the number of the visits was over-estimated, that certain visits charged were unnecessary, and that some visits were for social rather than professional objects. The court found no evidence to support those suggestions. The professional interest of the case lies chiefly in the two other contentions—namely, that the charges were too high and that some reduction or relief is by custom allowed by one medical practitioner when attending another. Lord Wark referred in his judgment to the standing of Dr. MacArthur in the district and elsewhere and to the suggested arrangement that doctors charge a fee of 5*s.* per mile when attending patients at a distance, this fee being sometimes adjusted to circumstances. "Notwithstanding the evidence of eminent medical men," the judge came to the conclusion that 6 guineas a visit was excessive in the circumstances and he gave judgment for £300, which was at a rate of approximately 4 guineas.

As regards the bank's argument that charges should be reduced or waived when one doctor attends another, the judge said the evidence failed to satisfy the court that there was any custom in the medical profession in Scotland or in the Oban district which would import into a contract for medical services an implied condition that either no charge would be made, or that only outlays would be charged, in the case of a patient who was a retired medical practitioner. The judge held it would be unreasonable to expect a doctor, summoned from a long distance in preference to one much nearer the patient's home, to attend the patient without remuneration for the reason suggested. Presumably there is here no difference between Scottish and English law. In each case the court has to ascertain what was the contract between the parties. Prima facie the acceptance of medical services implies the promise to pay reasonable remuneration for them. If the claim for fees is met by the argument of custom (the custom of one doctor not to charge another for attendance), under English law at any rate it would be necessary to show that the custom was inter alia definite and certain. If there was any doubt whether the custom was to charge merely out-of-pocket expenses or to make no charge at all, or if there was any doubt whether the custom applied as between two practising doctors but not as between a practising doctor and a retired doctor who was not in a position to reciprocate, then those who relied on the suggested custom would presumably have failed to establish it as something definite and certain. It may be remembered that in an English case a few months ago an old lady had insisted on being attended by her son who was a doctor. After her death the executors unsuccessfully repudiated his claim for fees, alleging a custom of doctors to treat their relatives free. These disputed claims are prima facie simple questions of contract. They become complicated because the doctor exhibits no price-list or tariff and does not present his bill at each visit. It is consequently sometimes necessary for a court of law to decide afterwards what was a reasonable charge.

PUBLIC HEALTH SERVICES

Infant Mortality in a Migratory Population

Sir John Collie, as chairman of the public health committee of the metropolitan borough of Paddington, has drawn attention to the relatively unfavourable position with regard to infant mortality occupied by some of the western metropolitan boroughs, a position which he thinks cannot fail to be regarded with surprise and even dismay. In Paddington he shows there has actually been an upward trend in the infant mortality-rate during the last ten years, so that in 1926–31 its rate (86 per 1000) was some 30 per cent. higher than that of London as a whole (64 per 1000), and this in spite of the presence of a very large amount of both voluntary and official child welfare work in the borough. Sir John Collie's aim, in this report, has been to present a simple unbiased analysis of all available facts relating to this unfortunate position, so that fuller investigation may be stimulated and a more intensive effort made to combat the responsible factors. His statistics show that diarrhœa and enteritis are causes of death in which some excess is to be found in the borough amongst children under 2 years of age. On the other hand, in this respect the rate for the borough, which is above that for all London, is far below that of the eastern boroughs of Bethnal Green, Shoreditch, and Stepney, although in total infant mortality Paddington shows a rate at least as high as those boroughs. According to the statistics of 1931 and 1932 (a somewhat limited basis) the excess in infant mortality in the Paddington area is not confined to any one period of the first year of life, though it is certainly appreciably greater after three months of age than before. The excess shows considerable local concentration. Such are some of the statistical aspects set out by Sir John Collie.

One of the possible factors contributing to them has been studied in a special inquiry made by Dr. G. E. Oates, medical officer of health for the borough. With regard to the children whose births were registered in the last quarter of the year 1932, it was ascertained in each instance how long the parents had been resident in the borough before the birth of the child. Out of 485 births the length of residence was under one year in nearly one-third, and it was within this third that the excessive infant mortality-rate was to be found. Dr. Oates concludes, therefore, that the high rate of the borough is to a great extent due to the migratory or floating population, "a type frequently below the average economic standard," and influenced for, at the best, only a very short period by the educational work of the public health staff of the area. Though the period of investigation was short (three months), owing to the labour involved, the difference between the infant mortality-rates—194 per 1000 births for the "residence under one year" group and 89 per 1000 for the "residence over one year" group—is more than is likely to have arisen merely by chance. On the other hand it is difficult to determine what factors length of residence may cover. Persons who have recently moved into an area may include a larger proportion of newly married couples, so that the percentage of first-born babies, with possibly higher risk of death, is greater amongst them than amongst the older residents. In addition, the differences in mortality between the wards of the borough, referred to by Sir John Collie, must be remembered. If the "short residence group" is drawn from some wards rather than from others, a better comparison of the infant death-rates would be between the short and long residence groups within the same wards.

Further evidence is required that the size of the "migrating" population is abnormally high in Paddington. Its infant mortality-rate is much in excess of that of such boroughs as Lewisham, Chelsea, and Woolwich; is its "migrating" population equally in excess? It is obvious that these interesting reports raise many questions, and the further study that both Sir John Collie and Dr. Oates plead for is essential for their solution. Meanwhile the maternity and child welfare committee of the borough is considering an increasing home visitation and more frequent contact with mothers and newly born infants, especially in the areas of high infant mortality. By such means some improvement in the present high rate, it is to be hoped, may be achieved.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 5TH, 1933

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 11 (last week 7); scarlet fever, 2001; diphtheria, 760; enteric fever, 45; acute pneumonia (primary or influenzal), 444; puerperal fever, 45; puerperal pyrexia, 100; cerebro-spinal fever, 25; acute poliomyelitis, 20; acute polio-encephalitis, 1; encephalitis lethargica, 6; dysentery, 22; ophthalmia neonatorum, 87. No case of cholera, plague, or typhus fever was notified during the week.

Thirteen of the 22 cases of dysentery were notified from Cheadle R.D. (Staffs) and 6 from Clitheroe R.D.(Lancs).

The number of cases in the Infectious Hospitals of the London County Council on August 8th–9th was as follows: Small-pox, 19 under treatment, 2 under observation (last week 17 and 1 respectively); scarlet fever, 1894; diphtheria, 1538; enteric fever, 13; measles, 598; whooping-cough, 354; puerperal fever, 26 mothers (plus 10 babies); encephalitis lethargica, 255; poliomyelitis, 1; "other diseases," 212. At St. Margaret's Hospital there were 15 babies (plus 5 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 3 (1) from enteric fever, 11 (1) from measles, 5 (4) from scarlet fever, 14 (4) from whooping-cough, 28 (5) from diphtheria, 52 (12) from diarrhœa and enteritis under 2 years, and 11 (0) from influenza. The figures in parentheses are those for London itself.

Eastbourne and Sunderland each reported 1 death from enteric fever. Measles was fatal in 4 cases at Liverpool, 2 at Wallasey. Three deaths from diphtheria occurred at Leeds and at Birmingham, 2 deaths each at Hull, Liverpool, Warrington, and Walsall. Of the deaths from diarrhœa outside London, 8 were reported from Liverpool, 4 from Leeds.

The number of stillbirths notified during the week was 251 (corresponding to a rate of 38 per 1000 total births), including 55 in London.

CORRESPONDENCE

THE COMPLAINT OF THE FAMILY DOCTOR

To the Editor of THE LANCET

SIR,—I see that Dr. Sherris, from his letter in your columns under this heading, thinks that in my article in the *Evening News* I did a disservice to the people I thought I was helping—namely, the general practitioners of the country.

Apparently he bases his complaint mainly on three grounds. First, that I was depreciating the family doctor; secondly, that I under-estimated the inroads which are being made into his sphere of work; and thirdly, because I was writing in a lay paper about something which he regards as a domestic affair for the profession only.

The editorial comments and the quotation of the words that I actually used are almost sufficient answer on the first ground. I cannot imagine myself giving any support to those people who make attacks on the whole of our profession, or a particular section, because of the misdeeds of a minority; but neither can I think that it is an action of a friend of the profession to ignore these attacks and pretend that all members of the profession are a credit to it. In my life work I have been privileged to know many of the best and to admire their work, but I was made painfully aware of the existence of the others.

It is because I recognise that inroads have been made in the sphere of the general practitioner that I asked him to "wake up." I believe that most of the inroads have occurred because the family doctor was not doing the work for which public provision has now been made. Sometimes he did not do it because he did not know how—the fault mainly of those who educated him; sometimes it was because people could not afford to pay him for his work and he could not afford to do it for nothing. In my opinion it is the duty of our medical schools to turn him out capable of doing most of the work which is now done at antenatal, maternity and child welfare, and school clinics; and he and his fellows should organise themselves by means of public medical services to cater for the people who would be willing to pay for this work, if it could be provided for them on terms which they could afford.

As for exposing the nakedness of the land in the public press I wonder whether Dr. Sherris realises that the medical man is good "news" for the lay papers, and that they watch what goes on at medical meetings a good deal more carefully than a great many members of our own profession do ? Whether we like it or not our doings and our views *will* appear in the public press, and I may tell Dr. Sherris that the article was written not on my own initiative but at the request of an editor who had been reading what had happened at Dublin, and who did me the compliment of thinking that I could write on the subject with a knowledge of the profession on the one hand and a regard for the public interest on the other.

I hope Dr. Sherris is reading the correspondence in your columns on the "Future of Medical Practice," and especially the letters of Drs. J. Good and J. H. E. Brock. That ought to make him see that all is not well in the medical world, and that the ideas of some of its members are turning in a direction which I for one detest—namely, a State Medical Service. If we get a State Medical Service it will be because the medical profession has not sufficient public spirit or sufficient initiative to provide for the public what it ought to have, on terms that it can afford.

I am, Sir, yours faithfully,

London, August 11th, 1933. ALFRED COX.

THE FUTURE OF MEDICAL PRACTICE

To the Editor of THE LANCET

SIR,—The two letters in your last issue set out plainly two obstacles to success: lack of friendly coöperation amongst the practitioners of a district, and the impossibility of each individual keeping up to date in all branches of work to-day. A third obstacle is illustrated in your note on a hospital staff contributory scheme. This is the way in which the profession is exploited and controlled by hospital committees, more particularly in the rural districts where the staffs are formed by general practitioners. I would suggest a method by which all three of these obstructions could be removed in one stroke. The profession should cut out the word "opponent" and substitute "colleague" in all their mutual relations; insist on having a real share in the management of the local hospital; divide the work there into as many special departments as possible; use the out-patient department as their own consultation clinic; and recognise each other in private practice as specialists in the work they do at the hospital. This simply means team-work and business enterprise instead of individual exclusiveness, as Mr. A. R. Friel has so well put it.

I am, Sir, yours faithfully,

P. L. W. WILLIAMS.

PS.—I have retired from practice and am therefore not personally interested.

Padstow, August 14th, 1933.

CARDIOVASCULAR PAIN AS A BIOCHEMICAL PROBLEM

To the Editor of THE LANCET

SIR,—I would be greatly obliged if you would allow me to reply to the doubt raised in your review (August 12th, p. 363) as to the precise purpose of the monograph. It was not my intention to pose as one deeply learned in biochemistry, but rather "to arouse interest in this aspect of the problem without offering considered theories." The choice of the title was by no means easy, and I accepted a valuable suggestion that the purpose of the monograph should be defined in the preface. Having done this, I added, "It has been necessary to consider certain facts of both normal and morbid anatomy and physiology, which are scattered throughout the literature, *as a preliminary to discussion of the subject*." This should, I think, have spared your reviewer surprise that "the biochemical aspect of cardiovascular pain is not touched on till we are completing the first part."

view is that after a certain age the ordinary wear and tear of the body combined with the effects of disease and other strains seriously impair working capacity, so that the worker pulls a fraction only of his weight, and invalidity may be presumed. In practice, however, it does not appear that contributory old age pension legislation is based on either of these two conceptions. The age at which a pension becomes payable has, it seems, been generally settled more by rule of thumb than by theoretical considerations. It is usually 65 years, but in some countries it is 60 or 55 years. The age is, as a rule, lower for miners.

The proportion of persons over 65 years old in the population is progressively increasing. In some countries the proportion of such persons to the number of persons at productive ages—taken as 15 and 65 years—has risen from 10 per cent. in 1890 to 14 per cent. in 1930, and is likely to reach 25 per cent. in 1975. At that time every four occupied persons will be supporting one old age pensioner.

WIDOWS AND ORPHANS

All pension schemes, with one exception, provide pensions for widows. The French scheme is the exception; a widow is not entitled to a pension unless her husband has voluntarily earmarked for that purpose part of his old age pensions contribution. In some schemes a widow must establish that she was actually dependent on her husband and that she has lost not less than two-thirds of her working capacity. In others dependency is assumed and a pension awarded without inquiry into the widow's capacity to support herself.

All schemes include orphans among the persons entitled to a pension. In some schemes the pension is awarded to legitimate children only, but in most it is awarded also to legally recognised illegitimate children. The age at which the child's qualification for benefit ceases varies from 14 years in the Netherlands to 18 years for sons and 24 years for daughters (if unmarried) in Uruguay.

OTHER SURVIVORS

In many schemes a widower is entitled to a pension if he can prove that he is unable to earn a living and that his wife contributed substantially to his support. In a few schemes the parents and brothers and sisters of a deceased insured person are pensionable if they were actually dependent on the insured person, and (in the case of brothers and sisters) if they fulfil the age conditions that apply to orphans.

BENEFITS IN KIND

The benefits of pension insurance are not limited to the payment of pensions. In most schemes the insurance authorities are required or empowered to provide medical care for their pensioners, and much preventive work is done, particularly in relation to tuberculosis and rheumatism, which are among the chief causes of invalidity. Work of this kind has been most fully developed in Germany, where the invalidity, old age, and widows' and orphans' pension insurance scheme has during forty years of its history built up an extensive medical equipment, with 59 tuberculosis sanatoria, 61 homes for treatment or convalescence, 211 antivenereal dispensaries, various facilities for fresh air cures, &c. In 1931 the number of persons admitted to the insurance institutions was 79,000, and 48,000 patients were sent to other institutions at the expense of the insurance scheme. The modern tendency is to increase the activities of the insurance authorities in the treatment and still more in the prevention of disease.

One word as to the arrangement of material in this great monograph. The main elements of the problem are first discussed; the characteristics of possible typical solutions are then outlined; next, the national schemes are classified according to the solution which each embodies; and finally comes an analysis of the relevant legal provisions and statistics of the national schemes seriatim. There is no index, but the table of contents is so full and the matter so systematically set out that there need be no difficulty in referring to the appropriate place for any particular information that may be required.

OBITUARY

HARRY MORTIMER WHARRY, F.R.C.S.

SURGEON FOR DISEASES OF THE NOSE, THROAT, AND EAR,
THE BOLINGBROKE HOSPITAL

WE announced recently the death, on August 1st, of Mr. H. M. Wharry; the occurrence was rendered exceptionally sad by its untimely nature.

Harry Mortimer Wharry was born in 1891, the son of Surg.-Major Arthur James Wharry, an officer in the Egyptian army. He received his general education at Radley and New College, Oxford, where he proceeded to St. Bartholomew's Hospital for his medical training. He qualified as M.R.C.S. Eng., L.R.C.P. Lond. in 1916, and was at once sent on foreign service with the army, holding posts first in France and later in Mesopotamia. At the close of the war he returned to his medical studies and obtained the F.R.C.S. in 1922, and immediately decided to specialise in diseases of the ear, nose, and throat. After holding posts as clinical assistant in these subjects at St. Bartholomew's and St. George's, he was appointed assistant in the throat and ear department of University College Hospital, and later, laryngologist at the Mount Vernon Hospital and the West End Hospital for Nervous Diseases. He placed his experience on record in communications to the columns of the *British Medical Journal* and *The Lancet*, and these clinical records were seen to be of sound practical value although made very shortly after his holding of hospital appointments. He became particularly interested in the work of the National Institute for the Deaf and was chairman of the medical subcommittee of the Institute, whose exertions have of recent times borne the practical fruit of focusing both public and official attention upon the needs of the deaf population. He was a member of a committee set up by the London School of Hygiene and Tropical Medicine in coöperation with the Institute to inquire into the treatment of deafness.

Mr. Wharry at the time of his death was oto-laryngologist at the Bolingbroke Hospital, and was, until his final illness, engaged in the study of tests for deafness, a department of medicine where his expert knowledge will be seriously missed. He married, in 1919, Cicely Henriette Bless, by whom he had two children.

THE LATE SIR RONALD ROSS.—At the church of St. Martin-in-the-Fields, London, on Monday, August 21st, at 1.20 P.M., Mr. John Masefield, the Poet Laureate, will give an address on the work of Sir Ronald Ross. The date is the thirty-sixth anniversary of his discovery of the malarial parasite in the mosquito. Recitations of two of Ross's poems will be given, and a hymn which he composed will be sung.

PANEL AND CONTRACT PRACTICE

Troubles of a Locum Tenens

A MEDICAL man with the highest qualifications, who registered in 1931 and has since been working as locum tenens in general practice, writes to complain how difficult some practitioners make it in national health insurance matters for the locum whom they employ. He asks for guidance in the following types of incident which, he says, have occurred in his experience.

> "1. In more than one practice the dispenser has called out to a group of waiting children (acting as messengers), 'Any more for prescriptions or certificates?' and so one has to sign (*per pro* admittedly) a lot of certificates without having seen the patient. It is frankly impossible for a locum in a strange town to add these patients to his list on the following day and to see them all."

There is no harm in a locum repeating medicines previously ordered by the principal even if he has not had time to see the case, provided this does not continue for week after week. This position is the same as in private practice. There is, however, no justification for signing a panel certificate in this way, for the certificate runs "I have examined you on the undermentioned date," and to sign such a statement if it is not true is a breach of the terms of service and offends the penal code of the General Medical Council. For this offence the chief might have to appear before the medical service subcommittee and the locum himself might have to answer charges before the General Medical Council. There are three ways of dealing with this certificate position. (1) Instruct the messenger that the patient must personally attend surgery before any certificate can be given. If he is not well enough to attend, (2) arrange to visit the patient during the week on any day convenient to the doctor between one Sunday and the next. No special day need be specified, for it is quite unnecessary to certify a patient as unfit on any particular day of the week. If the request comes on a Saturday night for a certificate for that week, (3) write to the agent on a sheet of note-paper to say that it is understood that Dr. X was attending Mr. Y and was giving Mr. Y certificates of incapacity, that Dr. X is away, that as the locum in charge it has not yet been possible to visit this patient, and that this certificate of incapacity is given on the understanding that the same conditions prevail as when Dr. X was in attendance. This will explain the position to the agent, who will probably then wait for the proper form, Med. 40, which can be given after this Mr. Y has been seen.

> "2. Patients ask for certificates to be ante- or post-dated. When one demurs, they say 'But Dr. — always gives me it,' or 'I can't come to-morrow,'—and if one persists in refusing, a lot of trouble is caused."

Antedating and postdating certificates is contrary to regulations and cannot be done at all on the official form, Med. 40. It can be done on private note-paper, but care must then be exercised not to certify something that is not true. Patients are often worried about this quite unnecessarily, and it is quite easy to explain that the date given on Med. 40 does not affect the amount of sick pay, although it may cause delay. But they obtain their correct money just the same in the end. Some agents try to insist that their members must get a certificate on (say) Tuesdays, but this is not so.

> "3. When I have suggested to relatives that their child needs dressings for wounds or burns, &c., or cod-liver oil for their general health, they have said 'Well, would you put it on the prescription in the father's name?' I have refused, but I am certain such patients would complain to their own doctor, and it would adversely affect my chances of getting another locum."

This is a serious offence on the part of the patient as well as of the doctor if he accords to the request. The proper thing is to report it to the local insurance committee. In such a case it is advisable to check the medicine supplied to the patient to make certain that the quantity ordered lasts the correct time, and that a five-day supply of medicine does not come back for a refill in three days' time.

When a practice is discovered in which such things happen, the locum would be well advised to inform both the agency through whom he was engaged and the secretary of the local panel committee. The committee will investigate and give friendly advice to the principal of the way in which he should conduct his practice in conformity with regulations. Certainly no blame would attach to the locum for the information given. Before doing this he should make a plain, straightforward statement himself to the principal on the state of affairs.

A Question of Fact

A complaint against a practitioner was recently considered by the Middlesex insurance committee on a report from its medical services subcommittee. On Saturday, April 22nd, according to the report, this doctor visited a patient, diagnosed congestion of the lungs, and promised to call next day. The complaint was that he did not carry out this promise. The patient's widow said she went to see the doctor on the Monday and that he gave no explanation why he had not called on the previous day; he advised the patient's removal to hospital, where death took place on the following Friday. Evidence that the doctor did not call on the Sunday was given by the widow, her sister, and neighbours. The widow said she was in front of the house and listened all day for him. Her sister gave similar evidence. It was agreed that the front-door bell did not work, but it was stated that the doctor found that out the day before when he called. The neighbours said they specially watched for the doctor but did not see him. The practitioner, in rebutting the charge, affirmed that he called on the Sunday, but there was no reply to his knock on the door. He produced no witnesses of this visit, but in view of the conflicting evidence the medical services subcommittee dismissed the case. This decision was questioned by members of the insurance committee. One member said he thought there was a prima-facie case for further inquiry. The difficulty facing the committee was that they could not place the witnesses on oath, and he asked that the matter should be referred to the Ministry of Health. This, he was told, could not be done; the widow, however, could appeal to the Ministry. Another member suggested that as the doctor knew that the patient had congestion of the lungs he had, by saying that he walked away from the house, ruled himself out as a truthful witness. The same view was taken by a speaker who said he was satisfied that the doctor was a liar; but as this could not be proved the committee must accept his word. The question was asked if the doctor kept a record of his visit as required by the regulations, and a medical member of the committee replied that a practitioner was only required to record a visit to a patient and not a visit to a house. He made the point too that congestion of the lungs was not always serious. He suggested that the evidence of the neighbours was worthless; they might not have been in the front of the house all the time. Finally it was decided by a large majority to refer the report back to the subcommittee for reconsideration.

"Commercially Minded," or Shackled by Regulations

CANDID FRIEND writes: "I have read the note under this heading in your last issue, and I must say, frankly, that the points raised seem to me trivial, and calculated to give a wrong impression, especially to foreign readers, of the conditions under which doctors work in the British insurance scheme. Let me take them in order:

(1) An insured patient makes a complaint against a doctor, which is found to be unjustified; therefore we cannot be surprised if he becomes 'commercially minded.' But this sort of thing is not peculiar to insurance practice. In private practice a doctor may be taken into court by a patient, be put to considerable expense, and given a damaging publicity on an unjustified charge. Doctors have to be prepared for such events, and if they are wise they join a defence society. The insurance regulations provide a simple and inexpensive procedure for dealing with complaints. The alternative is to have the complaint heard in a court of law, and the doctors at the beginning of the scheme preferred the procedure prescribed in the regulations. As a matter of fact many of the complaints made are justified, and clearly the insured persons must be given some right of complaint against neglect.

(2) A person who ceases to be insured has no right to medical benefit, and therefore no doctor is at risk for him. When he re-enters insurance he is not on his old doctor's list, and the doctor is still not at risk. If he applies to his old doctor with his new medical card the doctor is under no obligation to take him on his list. All he need do is to give any emergency treatment that may be necessary, and for this there is a special payment.

(3) Clause 7 (3) was inserted in the terms of service at the request of the doctors to meet the case of an insured person who on applying for treatment does not disclose that he is insured. He cannot 'demand' treatment as a private patient; the word 'demand' conveys a wrong impression. He can ask for treatment, but the doctor is under no obligation to treat anyone as a private patient. If the insurance committee think the patient has deliberately withheld from the doctor the fact that he is insured they will probably decide that he must pay the doctor himself, and this decision is made in a number of cases. The doctor must then recover his fees from the patient, which your contributor seems to regard as the proper course. But the doctor may not be able to collect his fees, especially in these times of unemployment. On the other hand, by the method to which your contributor takes exception, the doctor is sure to get fees on the temporary residents' scale, which in some areas will be about 13s., but in other areas will be more. Anyhow they will be at least four times the amount he would receive if the patient were on his list. The point about the containers seems very trivial. If the patient had to pay an account for a long attendance the doctor would probably not only be out of pocket on the containers but probably would also have to accept a reduction of his account, and might not be able to collect anything. I am told that at the present time doctors are having a hard time in private practice with bad debts.

(4) The alteration of a prescription by a patient in such a way as to deceive the dispensing chemist must be very rare. If it occurred in a doctor's practice with sufficient frequency to affect his prescribing statistics it would be discovered in the pricing bureau even if it escaped the notice of the chemist, and if it escaped both the chemist and the bureau it would have still to pass the regional medical officer, who scrutinises the prescriptions before his interview with the doctor."

MEDICAL NEWS

University of Cambridge

On August 5th the following degrees were conferred:—

M.D.—* W. N. Leak, * R. C. Priest, R. J. V. Pulvertaft, J. L. Franklin, and R. W. Knowlton.

M.B., B.Chir.—* J. S. M. Pringle, J. W. Campbell, B. P. Harris, L. W. A. Lankester, F. G. Maitland, C. P. Bailey, R. A. Sykes, and G. R. Ellis.

B.M.—M. L. Rosenheim, A. N. McCrea, and J. W. Bromley.

B.Chir.—* J. G. M. Nisbett, * David Kyle, * E. W. Price, * J. G. Jones, * G. L. Foss, * R. H. Dobbs, Richard Cairns, O. A. Trowell, J. N. Groves, A. H. Charles, J. G. V. Smith, C. G. Batty-Smith, C. M. Carr, J. W. Maycock, and E. W. Taylor.

* By proxy.

University of London

A statement has been published that Prof. H. W. Florey has been appointed to the Sir William Dunn chair of pathology tenable at Guy's Hospital medical school. The Academic Registrar informs us that this announcement was made in error.

Medical Tour in Belgium

On Sept. 3rd a party of medical men and their families, and medical students, will leave Paris to take part in a tour, including Spa, Louvain, Brussels, and Ostend. Particulars may be had from the secretary, Voyage Médical Belge, 38, Avenue Auber, Nice.

A Report on Eugenic Sterilisation

The Departmental Committee on Sterilisation have finished hearing evidence but they are still awaiting the completion of certain returns which local authorities have been asked to furnish. They have now adjourned for a short time, but will meet again in September to settle their report, which they hope to complete by the end of October. A preliminary draft of the report is in course of preparation, but it has not yet been considered by the Committee, and statements purporting to forecast the Committee's recommendations are unfounded.

Fellowship of Medicine and Post-Graduate Medical Association

The following courses have been arranged to take place during September, and syllabuses, giving full details, are being prepared: diseases of infants, at the Infants Hospital, Vincent-square, London, S.W., Sept. 4th to 16th (every afternoon); psychological medicine, at the Bethlem Royal Hospital, Beckenham, Sept. 5th to 29th (Tuesdays and Fridays, at 11 A.M.); medicine, surgery, and the specialties, at the Westminster Hospital, London, S.W., from Sept. 18th to 30th (all day); diseases of the chest, at the Hospital for Consumption, Brompton, from Sept. 25th to 30th (all day); proctology, at the Gordon Hospital, Vauxhall Bridge-road, London, S.W., from Sept. 25th to 30th (afternoons). There will be a week-end course in rheumatism at the Royal Mineral Water Hospital, Bath, occupying the whole of Saturday, Sept. 30th, and Sunday, Oct. 1st. In addition to the above, a special tutorial course for men graduates only in medicine, surgery, and midwifery has been arranged to take place from Sept. 29th to Oct. 3rd at the Connaught Hall of Residence, 16, Torrington-square, London, W.C. Further details of these courses can be had from the secretary of the Fellowship, at 1, Wimpole-street, London, W.1.

g Edward's Hospital Fund for London

his fund has received a gift of freehold property to value of about £18,000. It is to form part of the nanent capital endowment of the fund, but is to be : separate as a permanent memorial to the late William Francis Radford from a member of the family.

ations and Bequests

y the will of the late Sir John R. Ellerman, the testator, ong other bequests, left £1500 to King Edward's pital Fund for London; £1500 to the Westminster pital; £1000 each to the London Hospital, the Cancer pital, and the Middlesex Hospital; and £500 to Charing ss Hospital.

yal West Sussex Hospital

n August 10th the Bishop of Chichester, as president this hospital at Chichester, opened and dedicated the r private patients' block, which has been erected at a t of about £5000. Pending the opening of the block umber of paying patients have occupied rooms in the ses' quarters, and within 24 hours of the new block ng brought into use every bed was occupied.

dical Society of London

The programme for the first half of the 161st session this society opens with the annual general meeting at P.M. on Monday, Oct. 9th, and at 8.30 P.M. Sir John omson-Walker will give a presidential address on surgery the early nineteenth century. Subjects for the fortghtly Monday evening discussions are as follows: t. 23rd, the value of pre-operative investigations, to be roduced by Dr. F. J. Poynton and Mr. N. C. Lake; v. 27th, ward and dormitory infection, excluding the anthemata (Dr. J. A. Glover, Dr. J. C. Spence, and Dr. K. Le Fleming); Dec. 11th, staphylococcal infections r. Claude Frankau, Dr. J. H. Thursfield, and Dr. Lionel hitby). On Nov. 13th there will be a clinical evening. n Thursday, Nov. 16th, Sir Humphry Rolleston will give e Lloyd Roberts lecture, taking as his subject the sociation of medical men with literature. The Lettmian lectures for 1934 will be delivered by Dr. C. E. akin, who will speak on disturbances of the body mperature, and the annual oration by Sir Charles herrington.

Appointments

ARTER, H., M.B., Ch.B. Edin., F.R.C.S. Edin., has been appointed Medical Superintendent of the Mill-road Hospital, Liverpool.

ELLORS, T. HOLMES, M.Ch. Oxf., F.R.C.S. Eng., Honorary Surgeon to Out-patients, Royal Waterloo Hospital for Children and Women.

ertifying Surgeons under the Factory and Workshop Acts: ANDERSON, W. L., M.B., Ch.B. Glasg. (Kirton in Lindsey, Lincoln); HAYDON, W. E., M.B., B.Ch. Oxf. (Camelford Cornwall); WILLIAMS, R. N. H., L.R.C.P. Lond., M.R.C.S. (Nailsworth, Gloucester).

Vacancies

For further information refer to the advertisement columns

lbert Dock Hospital, Connaught-road, E.—Res. M.O. At rate of £110.

ll Saints' Hospital for Genito-Urinary Diseases, Austral-street, St. George's-road, S.E.—Res. H.S. At rate of £100.

arry Surgical Hospital.—H.S. At rate of £200.

elfast, Mater Infirmorum Hospital.—Radiologist.

irkenhead General Hospital.—Sen. H.S. £150. Also Second H.S., H.P., and Cas. O. Each at rate of £100.

irmingham and Midland Eye Hospital, Church-street.—Asst. S. Also H.S. At rate of £130.

irmingham P.H. Dept.—Asst. Res. M.O. £400.

lackburn and East Lancashire Royal Infirmary.—Hon. Asst. S.

radford Children's Hospital.—H.S. and H.P. Each £100.

ristol General Hospital.—H.P. At rate of £80.

ambridge, Addenbrooke's Hospital.—Res. Anæsthetist and Emergency Officer. At rate of £130.

ardiff, Welsh National School of Medicine.—Jun. Asst. in the Med. Unit. £250.

arlisle, Cumberland Infirmary.—H.S. At rate of £175. Also H.P., Second H.S., and H.S. to Spec. Depts. Each at rate of £155.

Cheadle Royal, Cheshire.—Asst. M.O. £350.

Chelmsford and Essex Hospital and Dispensary, London-road.—Res. M.O. £150.

Cheltenham General and Eye Hospitals.—H.S. £200.

Coventry and Warwickshire Hospital—Res. H.P. £160.

Derby, Derbyshire C.C.—Asst. Maternity and Child Welfare M.O. £600.

Doncaster Royal Infirmary.—Two H.S.'s. Each at rate of £175.

Evelina Hospital for Sick Children, Southwark, S.E.—H.S. At rate of £120.

General Lying-in Hospital, York-road, Lambeth, S.E.—Jun. Res. M.O. and Anæsthetist. At rate of £100.

Great Yarmouth General Hospital.—H.S. £140.

Hospital for Tropical Diseases, Endsleigh-gardens, W.C.—Two H.P.'s. Each at rate of £120.

Ilford Borough.—Asst. School Dental Surgeon. £450.

Ilford, King George Hospital.—H.S. At rate of £100.

Leeds, Herzl Moser Hospital, Leopold-street.—Res. M.O. £200.

Leicester Royal Infirmary.—H.S.'s, H.P.'s, and Cas. O.'s. Each at rate of £125.

Lincoln, County Hospital.—Laboratory Asst.

Liverpool, City Infectious Diseases Hospitals.—Asst. Res. M.O. £200.

Liverpool Heart Hospital.—Asst. Physician. £200.

Liverpool Royal Babies' Hospital, Woolton.—Res. M.O. At rate of £90.

Liverpool Royal Children's Hospital.—Res. H.P. for City Branch. At rate of £100.

Liverpool Sanatorium, Delamere Forest, Frodsham.—Asst. to the Med. Supt. £250.

Liverpool, Women's Hospital, Catharine-street.—H.S. At rate of £100.

Macclesfield General Infirmary.—Second H.S. At rate of £150.

Manchester Hospital for Consumption and Diseases of the Throat and Chest.—Hon. Consulting Thoracic Surg.

Manchester and Salford Hospital for Skin Diseases.—H.S. At rate of £100.

Middlesbrough, Holgate Municipal Hospital.—Jun. Res. M.O. £170.

Middlesbrough, North Riding Infirmary.—Sen. H.S. At rate of £200.

Middlesex Hospital, Mortimer-street, W.—Anæsthetist for Dental Dept. 10*s.* 6*d.* per session.

Miller General Hospital, Greenwich-road, S.E.—H.S. and H.P. Each at rate of £100.

National Hospital for Diseases of the Heart, Westmoreland-street, W. Res. M.O. At rate of £150.

Newcastle General Hospital.—Two H.P.'s and One H.S. Each at rate of £150.

Newcastle-upon-Tyne, Royal Victoria Infirmary.—Hon. Asst. Surgeon to Orthopædic Dept.

Oxford, Radcliffe Infirmary and County Hospital.—Res. Surg. O., Two H.S.'s, H.P., and Obstetric H.P. Each £200.

Penang, George Town.—Deputy Municipal Health Officer. $7200.

Preston, Sharoe Green Hospital.—Jun. Res. M.O. At rate of £100.

Prince of Wales's General Hospital, N.—Jun. and Sen. H.P.'s and H.S.'s. At rate of £90 and £120 respectively.

Princess Beatrice Hospital, Richmond-road, Earl's-court, S.W.—Sen. Res. M.O. £150. Also Res. M.O. At rate of £110.

Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Dist. Res. M.O. Also Asst. Res. M.O. Each at rate of £80.

Queen's Hospital for Children, Hackney-road, E.—H.S. and Cas. O. Each at rate of £100.

Royal Eye Hospital, St. George's-circus, Southwark, S.E.—H.S. and Asst. H.S. At rate of £150 and £100 respectively. Also Hon. Phys.

Shrewsbury, Royal Salop Infirmary.—Cas. O. and Res. Anæsthetist. At rate of £160.

Southampton Children's Hospital, &c.—Res. M.O. At rate of £150.

Stockport Infirmary.—H.S. £150.

Stoke-on-Trent, Staffordshire Royal Infirmary.—H.S. £150.

Swanley, Kent, Hospital Convalescent Home, Parkwood.—Res. M.O. At rate of £200.

Swansea, Infectious Diseases Hospital.—Res. M.O. £350.

Wakefield, West Riding of Yorkshire Mental Hospitals Board.—Three Med. Supts. £1000–£1400.

Walsall County Borough.—Asst. M.O. £600.

Walsall General Hospital.—H.S. At rate of £150.

Walsall, Manor Hospital.—Jun. Res. Asst. M.O. £150.

Weir Hospital, Grove-road, Balham, S.W.—Jun. Res. M.O. £150.

Wembley Hospital.—Res. M.O. At rate of £150.

West London Hospital, Hammersmith-road, W.—H.P., H.S. Also H.S. to Throat, Nose and Ear Dept. Each at rate of £100.

Weston-super-Mare General Hospital.—Res. M.O. £150.

Wigan Royal Infirmary.—H.S. At rate of £150.

Windsor, King Edward VII. Hospital.—H.S. At rate of £100.

Wolverhampton, New Cross Hospital.—Res. Asst. M.O. £200.

Worcester Royal Infirmary.—Third H.S. £120.

York County Hospital.—Res. Anæsthetist and Asst. H.S. £150.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Eskdale, (Cumberland) and at Malvern (Worcester).

INDEX TO "THE LANCET," VOL. I., 1933

THE Index and Title-page to Vol. I., 1933, which was completed with the issue of June 24th, is now ready. A copy will be sent gratis to subscribers on receipt of a post-card addressed to the Manager of THE LANCET, 7, Adam-street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive Indexes regularly as published should do so now.

NOTES, COMMENTS, AND ABSTRACTS

ABOUT BEE VENOM*

By F. THOMPSON, M.R.C.S.
FORMERLY DEMONSTRATOR OF PHYSIOLOGY IN THE LONDON HOSPITAL MEDICAL COLLEGE

THE venom is produced in two "acid" glands, tiny longish tubes with a gland at the tip of each, and with a lining whose nature is almost certainly secretory also. Here the main bulk of poison is produced, and it is poured thence into the poison sac, whose function is purely storage. As the venom is in process of ejection by pressure on the poison sac it is joined by a small admixture from the "alkaline" gland on its way to the sting. The latter is a very sharp fine horny "hypodermic or intradermal needle" in which move up and down two barbed lancets. The fixation of these lancets in the skin leads to prodigious efforts on the part of the anchored bee, and these maintain the pressure necessary to empty the poison sac.

Chemical Properties

The chemical nature of the venom has been investigated by Langer[1] and by Flury.[2] Langer dropped the poison sacs, together with stings and glands, into 96 per cent. alcohol (thus precipitating any protein, F. T.). The residue, insoluble in alcohol, was dried at 40° C., ground to a fine powder, and then extracted with water. This filtered watery extract consisted of a clear yellowish fluid "which showed the characteristic reactions of the whole [sic] poisonous secretion." The activity of this watery extract (after the 96 per cent. alcohol, F. T.) was not diminished by heating to 100° C. for two hours. Langer said that the freshly deposited drop of poison, varying in weight from 0·2 to 0·3 mg., is clear as water, has an unmistakable acid reaction, bitter taste, peculiar smell, and specific gravity of 1·131, and after drying at room temperature leaves about 30 per cent. dry residue. The acid reaction he attributed to formic acid. He concluded that the active principle of bee venom was an organic base.

Flury tackled the "organic base." He found the compound as isolated by Langer was in a protein-free condition (after 96 per cent. alcohol, F. T.), and that part of the poison was of a lipoid nature, a very complicated substance containing nitrogen. He detected the following substances :—

1. A nitrogenous compound with a ring formation, derived from the indol series, which can be isolated in the form of tryptophan.
2. Choline.
3. Glycerin.
4. Phosphoric acid.
5. Palmitic acid.
6. An unsaturated, uncrystallisable, fatty acid of high molecular weight.
7. A volatile fatty acid of low molecular weight, probably butyric acid.
8. A nitrogen-free fraction which represents the physiologically active portion of bee venom, probably a cyclic acid anhydride, which causes inflammation, and when dissolved in oil raises blisters. The acid derived from this has a hæmolytic action, and exhibits the general characteristics of saponin.

Do we wonder that a sting is painful ?

Flury concludes that the active substance is an intricate compound with lecithin and a basic fraction, and forms a connecting link between the protein-free sapotoxins of animal origin (e.g., the crotalotoxin and ophiotoxin of snake poisons) on the one hand, and poisons of the cantharidin group on the other.

Action of Bee Venom

The normal result of a bee-sting in the average human being is: (1) immediate pain at the seat of injection; followed by (2) the appearance of a small white area at the site surrounded by a red area of varying size. (3) Some degree of swelling, more or less, follows this, and, slowly subsiding, gives place to (4) cutaneous irritation. All traces have usually disappeared in 24 hours.

As a matter of idiosyncrasy more serious effects of bee venom occur in about 2 per cent. of humans. These may be roughly classified (in order of increasing rarity) into :—

(*a*) Abnormal swelling and irritation lasting an abnormal time.

(*b*) Massive urticaria and œdema supervening in from five minutes upwards, accompanied or not by the following:

(*c*) Shock and collapse varying in degree even to loss of consciousness with low blood pressure and rapid pulse, followed later by mild pyrexia and perhaps diarrhœa and polyuria.

(*d*) True dyspnœa coming on soon after the sting.

(*e*) Within a minute or two a hot flush may spread over the whole body, accompanied by great difficulty in breathing, wheezing, coughing, almost choking, general trembling, great anxiety, and even coma. This may be accompanied in women by uterine ("bearing down") pains. This condition may last up to three or four days but not usually so long. It is rarely seen.

(*f*) Death.—This has been recorded within about ten minutes of one sting.[3]

I would like here to stress the fact that the more serious effects are very rare indeed, while *a*, *b*, and *c* are seen in about 2 per cent. I have made a long series of observations with a view to determine what type of person reacts badly to bee-stings. The result has been fruitless. I have made further investigations into the type of person more liable to be stung. This has been much more productive and resolves itself definitely into a matter of *aroma* and *irritability*. Children are seldom stung; people who perspire freely are highly susceptible, as also are females during menstruation. People who are highly nervous and irritable are more often stung. The connexion with the thyroid gland is obvious and interesting.

In very young bees the poison glands are immature, and by instinct they do not use their stings. Different strains of bee probably differ in the potency of their venom, as in gentleness (or the reverse).

Experiments on Animals (Human and Otherwise)

Essex, Markowitz, and Mann[4] found that injection of bee venom into a dog caused an immediate rise of blood pressure in 12 seconds, followed by a very rapid and much more marked fall. They found that the womb of a rabbit perfused with a solution of bee venom went into marked contraction, while with similar perfusion the contractions of the heart became rapidly more feeble. They found, further, that bee venom caused rapid contraction of the breathing tubes, that the red blood-cells became disintegrated, and their colouring matter dissolved in the fluid part of the blood. This hæmolysis also occurs in the test-tube. Furch[5] found that dry poison dissolved in water has the same action as natural poison-inflammation, destruction of tissue, spasms, paralysis, hæmolysis. He found that impure poison in the open was potent for from 8–14 days; in phials it remained without weakening 3½ years, and it stands temperatures from −6° to 100° C. without apparent effect. In the horse a 1 per cent. solution dropped into the eye produced acute inflammation. A mouse died in 12 hours after two stings. (A reliable bee-keeper has told me that he saw a mouse, stung by a bee, collapse and die in a few minutes.)

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* Reprinted, with additions and alterations, from the Bee World (1932, xiii., 37).

Furch found that the fatal dose was usually in proportion to the body-weight. (This would also depend on idiosyncrasy and the age of the bee.) He also found that bee venom caused acute nephritis. He found the venom of some strains of bee to be more potent than others, and further verified the work of Phisalix, who showed that the gradual addition of bee poison makes animals more resistant to otherwise fatal doses, but not altogether immune.

K. S. Thompson[6] has shown that a precipitin reaction is obtained with the serum of those stung and the sting of the bee. He triturated the poison sacs and glands in normal saline at a strength of ten stings per c.cm., filtered through a Seitz filter into sterile flasks and refrigerated. During the process a heavy sickly odour was emitted, which caused severe frontal headache (and some lacrymation, F. T.). The pH of this saline solution of bee venom was 4·2, but this was buffered to neutral by an equal volume of human serum. This saline solution, when added to a suspension of washed red cells and incubated at 65° C. (one drop of saline solution to 50 drops of suspension), caused hæmolysis in 3–10 minutes. Similarly subcutaneous injection of extract into the human leg caused ecchymosis in 24 hours.

Precipitin reaction.—Sting extract prepared as above, extract prepared by Langer's method, extract of bee body prepared as above, the original extract boiled and filtered, original extract treated with alcohol and filtered, and the above extract fully saturated with ammonium sulphate and filtered, and Kretschy's "Immenin bee venom," were then tried against normal serum and the sera of bee-keepers who had been stung. Positive flocculation only occurred in the tubes containing the saline sting solution and the sera of bee-keepers.

Optimum flocculation.—One drop of saline sting extract with 10 drops of a 1 in 60 saline dilution of serum to be tested, refrigerated over night, and incubated at 65° C. causes flocculation after about 12 minutes. After injection of this extract in repeated doses into a person who previously gave a negative reaction, a positive flocculation occurred after 12 days, but not of the same degree as the bee-keepers' serum tested. The bee-keepers' blood was negative to the Wassermann reaction.

The above experiments explain the facts well known among old bee-keepers, that they slowly become practically immune against ill-effects from bee-stings, even in large quantities, being only slightly affected at the commencement of the "bee season" after they have been without stings for over six months.

I found that almost complete immunity from bee venom in no way protected me from *wasp venom.* I therefore underwent a course of wasp-stings and found that I acquired an immunity from them. Wasp venom therefore differs from bee venom, but has a "family resemblance." Unlike bee-stings, wasp-stings not infrequently produce sepsis.

Therapeutic Uses

The therapeutic action of bee venom is at the moment confined to the relief or cure of certain forms of "rheumatism," and it is proverbial among bee-keepers that members of "the craft" do not suffer. Those types which come under the heading of muscular rheumatism, lumbago, sciatica, fibrositis, and the rheumatic complications after acute or subacute rheumatism, are curable in about 80 per cent. by a course of bee-stings, and I myself after some 20 years' suffering was cured in this way in six weeks (afterwards keeping a hive in the yard by my consulting-room for the benefit of others willing).

In the more chronic forms of arthritis and periarthritis the results are *not* encouraging, though the method is not unworthy of trial when other remedies fail, and one does occasionally (as with other remedies) see surprising results.

At first, permission being of course obtained, one sting is administered on the forearm or arm or other place most convenient to the patient. The administration at the site of pain might have a moral effect in addition. The toxic effect of one sting is noted, and if it is not unusual the treatment is repeated twice weekly for the first week, two stings twice weekly for the second week, three the third, and so on. By the end of the sixth week immunity is obtained and relief from the symptoms as well. If the patient reacts badly to the first sting this treatment should not be continued. The patient may, if desired, after the first sting continue the treatment himself at the nearest apiary. If in the country he should be encouraged to keep bees himself.

The therapeutic action may be by "protein shock." I have used Kretschy's "Immenin bee venom" for therapeutic purposes without any good result.

Diagnostic Value

Kretschy (at the International Bee Conference, 1930) claimed that bee venom had diagnostic in addition to therapeutic value. This diagnostic reaction he claimed in cases of tuberculosis, syphilis, and alcoholism. As to the first two I can venture no opinion; on the third I can, having seen two separate cases of delirium tremens stung without unusual reaction. The truth probably is that the addict is so uncertain in steadiness of both hand and temper that he is stung with unusual frequency.

Treatment of Bee-stings

Treatment of stings comes under the two heads: (1) immediate, and (2) prophylactic.

Immediate treatment of the *normal* bee-sting is merely placative. Would the application of a "blue bag" to the site of a hypodermic injection of morphia stop a patient from somnolence? One must at the same time remember that the average patient does not like to be treated like a bee, and told to "buzz off." Any elegant, harmless lotion or cream, that does not stain the linen, will answer.

But in the cases of severe reaction the treatment must be swift and decisive. Adrenaline or ephedrine hypodermically and immediately, with brandy or sal volatile by the mouth, is the correct treatment. If the shock is severe and the blood pressure is low, pituitrin may be added with advantage. This treatment, especially the adrenaline, may be repeated as necessary. Evatmine is very good if immediately to hand. The whole essence of this treatment is speed.

For the subsequent cutaneous irritation 1 per cent. or 0·5 per cent. carbolic lotion is advised.

The prophylactic treatment of those hypersensitive to bee venom is interesting, and was suggested by Braun,[7] who succeeded in desensitising patients with high dilutions of bee venom applied to a scarified area and decreasing the dilution till they could take undiluted venom without untoward effect. Injections were then made at two-day intervals until the patient could receive large injections of undiluted venom.

This is obviously the prophylactic treatment of severe cases, but is obviously tedious and expensive.

Summary

Bee venom is a highly complex poison containing a protein poison and a lipoid among the other bodies of which formic acid is in negligible quantity.

The protein is probably destroyed by alcohol or boiling.

The immediate pain is caused by pressure on minute sensory nerve-endings in the skin, while the later swelling is the expression of the body reaction to the venom.

Severe symptoms follow in a small proportion of those stung and should be met immediately with adrenaline and pituitrin. Desensitisation is possible and valuable.

The human body manufactures an antiserum in 12 days which protects, according to amount, from ill-effects of bee venom.

Treatment with bee-stings cures certain forms of rheumatism, especially muscular rheumatism, lumbago, and sciatica.

There is still much investigation to be done on bee venom; for instance, to discover why several persons immune for years should suddenly become hypersensitive, but these notes are only a rough summary of the work done to date.

In making these brief notes I wish to record my indebtedness to Mr. D. Morland, apiarist to the Lawes' Agricultural Research Institute at Rothamsted, for his patient search for references on the subject.

REFERENCES

1. Langer, J.: Arch. für exper. Path. und Pharm., 1897, xxxviii., 381.
2. Flury, F.: Ibid., 1920, lxxxv., 319.
3. Goodman, N. M.: THE LANCET, 1932, ii., 708; Comment by Thompson, F., Bee World, 1933, xiv., 7.
4. Essex, Markowitz, and Mann: *Amer. Jour. of Physiol.*, 1930, xciv., 209.
5. Furch, J.: Wien. [illegible]
6. Thompson, K. S. [illegible] of material demonstrated [illegible]
7. Braun, L. I. B.: [illegible] xxiii., 408.

Epsom Downs.

EUGENIC STERILISATION IN THE UNITED STATES

TWENTY-SIX States of the U.S.A. now have effective sterilisation laws, and a map reproduced on the cover of the April issue of the *American Birth Control Review* shows them to include nearly half the country, with a preponderance in the west, and especially the north-west. This issue of the journal is devoted to eugenic sterilisation, and in view of recent developments in other countries interest especially attaches to a paper by Mr. J. H. Landman, whose book on the subject was reviewed in our columns a year ago. Mr. Landman, a cautious advocate of selective sterilisation, writes: "Many propagandists have prostituted what very scant scientific knowledge we have on human heredity and eugenics to justify ancestor worship, race superiority, snobbery, class distinction, intellectual aristocracy, and race prejudice. The science of eugenics warrants no such conclusions. Its future is promising but at present it needs debunking." The article also describes how the *State of North Carolina rendered its sterilisation* law unconstitutional as the result of an action following the sterilisation of one Mary Brewer. It appears that the latter was sterilised not because of bad inheritance but rather on the grounds that she was the mother of five children, the wife of a lazy and drunken husband, and was dependent on the State for support. Commenting on the case, Landman says: "It might well be that the court declared the N. Carolina statute illegal because it could not see a virtuous woman sterilised for no good cause." It is to be presumed that the operation was here performed against the patient's will. To the same issue of the journal Dr. L. E. Witney contributes an article entitled "Why I Oppose Compulsory Sterilisation." The main argument here advanced is that the usefulness of sterilisation would be diminished if the operation came to be regarded as carrying with it a social stigma; which would, he thinks, inevitably happen if it were compulsorily applied, or used on *criminals as a punishment* for crime. The journal also includes the text of two American Sterilisation Acts.

MORE DOCTORS' HOBBIES

DUBLIN is not alone in exhibiting doctors' hobbies. At the Model Engineer Exhibition, to be held in London towards the end of this month, may be seen some fine examples of model locomotives and ships, done as a professional pastime. Last year Dr. J. Bradbury Winter sent in a model in silver of the *Rocket*. This year Mr. C. Nepean Longridge, F.R.C.S. will have on view a quarter-inch scale model of the *Cutty Sark*. The fact that the hull of this model is sheathed with about 2000 copper plates, that the rigging consists of home-made wire-rope of various sizes, that some hundreds of shackles were used in fastening the rigging, and over 400 blocks, each containing a metal sheave, had to be made, account for many of the 6000 hours spent in its construction. The materials cost £5, the value of the finished model—which has been accepted for the Science Museum, at South Kensington—is at least £1000.

Dr. Stephen Rowland, medical officer of health for Northampton, is entering a fine model of the clipper *Muncaster Castle*, in which he served for five years.

AN EASY METHOD OF COLLECTING HUMAN MILK

Miss Hilda G. Coope, S.R.N., *calls our attention* to a simple apparatus for obtaining fresh human milk for premature or weakly babies for whom a natural supply *is not available*. *All that is required* is two glass nipple shells or reservoirs, such as were commonly employed a hundred years ago for the purpose of protecting the clothing of nursing women, and which may still be obtained from Messrs. S. Maw, Son and Sons, at a cost of 2*s*. 8*d*. a pair. When the shells are applied with a binder to the breasts the nipple projects through the central opening into the cavity of the vessel, and the milk drains into them. In the usual interval between feeds an ounce or more is thus collected. This is poured out of the small hole in the rim, which meanwhile has been kept uppermost, into a clean vessel, and scalded before use. The shells may also be of value to the mother in the early days of lactation in pressing out her flat nipples and *relieving pain due to engorgement*. When the period of excessive secretion is passed, and it is no longer necessary to relieve the breasts, the shells still *serve a useful purpose. While the baby is being nursed* at one breast, a shell is applied to the other, and several ounces a day can thus be collected. In this way 6 to 8 oz. of breast milk a day can usually be saved from waste, for periods varying from four to twelve days. If the method were used in the wards of maternity hospitals and nursing-homes a regular and ample supply could be organised for cases who need it. "I have seldom," Miss Coope writes, "found a patient who was not able and glad to help a needy baby in this manner, while those in charge of such babies are only too ready to send, even a long distance daily, to obtain it. My chief difficulty has been to decide whom to help, as so many always seem to be in want."

BROMIDROSIS.—Dr. E. H. Smith (Surbiton) writes: This troublesome complaint, very prevalent at this time of year among young adults, can be greatly relieved and in many cases cured if the sufferers will increase the consumption of common salt with their food.

Births, Marriages, and Deaths

BIRTHS

BURKE.—On August 8th, at Antrim House, Cliftonville-road, Belfast, the wife of Capt. Maurice R. Burke, M.B., R.A.M.C., of a son.

DUTHIE.—On August 7th, at Malvern, the wife of F. W. Duthie, F.R.C.S.F [illegible]

MCELNEY.—C [illegible] ing-home, Rodney-street, Liverpool, [illegible] Dr. Ariel McElney, of Hong Kong—a son.

PURKIS.—On August 10th, at Wickham-road, Beckenham, the wife of Kenneth N. Purkis, F.R.C.S., of a daughter.

ROSE-INNES.—On August 6th, the wife of R. H. Rose-Innes, M.A., M.B., F.R.C.S.E., The Manor Farm House, Headington, Oxford, of a daughter.

DEATHS

CAPON.—On August 9th, at Pine View, Sonning Common, [illegible] Herbert James Capon, M.D., L.R.C.P., M.R.C.S., aged 82.

JONE [illegible] nursing-home, London, L. Gwynn Jones, F.R.C.S., late of Swanscombe, Kent.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

STUDENTS' GUIDE—SESSION 1933-1934

THE GENERAL MEDICAL COUNCIL

POWERS, DUTIES, AND CONSTITUTION

THE General Council of Medical Education and Registration of the United Kingdom is, first, a registering body: no person, even though his qualifications have been obtained by examination, is a *legally qualified* medical practitioner until his name appears on the Medical Register. Secondly, it is a standardising body, ensuring that there is a definite minimum of medical education and scientific examination. Thirdly, it is a penal and disciplinary body, having power to remove from the Register any practitioner convicted of felony or misdemeanour or adjudged guilty of professional misconduct. Fourthly, to the Council is committed the codification of pharmaceutical remedies. The duties of the Council are thus primarily of a public nature, and its construction shows its fitness for its fourfold responsibilities.

The Council consists of 38 members, of whom 18 are appointed by universities and 9 by licensing corporations; 5 members are chosen by the Crown on the advice of the Privy Council, and 6 others are elected by the members of the medical profession as Direct Representatives. The Crown members and the university representatives need not be medical men, and one layman appointed by the Privy Council now sits on the Council. Three members are appointed for dental business by the Privy Council under the Dentists Act, 1921, under which the powers and duties of the General Medical Council with regard to the keeping of the Dentists Register and the administration of the Dentists Acts were largely transferred to the Dental Board of the United Kingdom.

The Educational Curriculum

Professional Education.—The course of professional study after registration as a student occupies at least five years. The Final Examination in Medicine, Surgery, and Midwifery must not be passed before the close of the fifth academic year of medical study.

REGISTRATION OF MEDICAL STUDENTS

Before registration as a student every candidate must produce evidence that (*a*) he has attained the age of 17 years; (*b*) that he has passed a recognised examination in general education; and (c) that, *in addition thereto*, he has passed, or obtained exemption from, an examination, theoretical and practical, in elementary physics and elementary chemistry conducted or recognised by a licensing body. The standard of General Education required is approximately that of University Matriculation or entrance examination in the Faculties of Arts or Pure Science. Examinations, other than Matriculation, must be of the standard prescribed in Section 2 of the Regulations below.

An approved course of instruction in elementary biology at a secondary school or other teaching institution recognised by a licensing body may admit a student to the professional examination in elementary biology upon registration as a medical student. The student should in every case write beforehand to the Body whose qualification he desires to obtain, and, although it is not necessary to pass in Biology before registration as a student, application should be made at the same time to the Body selected to ascertain their requirements.

The candidate commencing medical study should apply to the registrar of the division of Great Britain and Ireland in which he is residing, according to a prescribed form copies of which may be had on application to the several licensing bodies, medical schools, and hospitals, or at the offices of the Council; and should produce proof that he, or she, has fulfilled the first three conditions.

MAINTENANCE OF REGISTER OF MEDICAL STUDENTS

1. The Education Committee prepares and issues from time to time a list of examining bodies whose examinations in general education fulfil the conditions of, and are recognised by, the Council.

2. The Council has recognised the undernoted university examinations which are conducted in Great Britain and admit to the Faculties of Arts or Pure Science, or to other Faculties, subject to the conditions specified below:—

Oxford University, Responsions; Cambridge University, The Previous Examination. The Matriculation Examinations of the following Universities: Birmingham, Bristol, Durham, Leeds, Liverpool, London, Victoria of Manchester, Sheffield and Wales, and the Entrance or Preliminary Examination of the Universities of Scotland.

The condition prescribed by the Council in Faculties other than Arts or Pure Science is that:—

The certificate shall bear evidence that the candidate has passed at the Matriculation or Entrance standard, in the following subjects, viz.: (*a*) English. (*b*) Mathematics, Elementary. (*c*) A language other than English. (*d*) A fourth subject, as defined in the regulations of the particular Examination, to be chosen from the subjoined list, viz.: History, Geography, Physical Science, Natural Science, Botany; Latin, Greek, Hebrew, French, German, or other language accepted by the University.

3. Subject to the condition prescribed above (Section 2), the Council will recognise those of the examinations conducted by recognised authorities in Great Britain which are accepted by any one or more of the above-named Universities as equivalent (under prescribed conditions as to "credits" or "grades"), for purposes of Entrance or Matriculation, to an Examination named in the preceding list (Section 2). In School or Leaving Certificates, the four required subjects must have been obtained at not more than *two* sittings. Such Examinations are:—

Bristol University: Higher School Certificate Examination; School Certificate Examination. Cambridge Local Examinations Syndicate: Higher School Certificate Examination; School Certificate Examination. Central Welsh Examination Board: Higher Certificate Examination; School Certificate Examination. Durham University: Higher Certificate Examination; School Certificate Examination. London University: Higher School Certificate Examination; General School Examination. Northern Universities Joint Matriculation Board: Higher Certificate Examination; School Certificate Examination. Oxford and Cambridge Schools Examination Board: Higher Certificate Examination; School Certificate Examination. Oxford Delegacy for Local Examinations: Higher School Certificate Examination; School Certificate Examination. Scottish Education Department: Leaving Certificate Examination.

4. The Council will continue to recognise certain Examinations conducted by Educational Bodies, other than those (mentioned in Section 3) whose Examinations are accepted by any one or more of the Universities of Great Britain. Recognition will not be extended under this Section to any Examination unless the Council is satisfied (*a*) that in scope and standard it is equivalent to a recognised Matriculation or Entrance Examination of a University of Great Britain, (*b*) that it fulfills the condition prescribed by the Council (Section 2), and (*c*) that the Examination has been completed at not more than two sittings. Such Examinations are:—

The College of Preceptors (England): Senior Certificate (with *credit*). The Educational Institute of Scotland: Preliminary Medical Certificate.

5. Subject to the prescribed condition (Section 2), the Council will recognise the Entrance Examination to the School of Physic of the University of Dublin, and the Matriculation or Entrance Examinations of the National University of Ireland, the Queen's University of Belfast, the Irish Royal Colleges of Physicians

and Surgeons; and also the Senior Grade or Leaving Certificate of the Department of Education of the Irish Free State, the Senior Certificate Examination of the Ministry of Education of Northern Ireland, and all examinations accepted by any one or more of the Universities of Great Britain or Ireland, as equivalent, for purposes of entrance or matriculation, to the above-named University Examinations.

6. Subject to the prescribed condition (Section 2), the Council will recognise all Examinations of Colonial or Foreign Universities which are accepted by any one or more of the Universities of Great Britain as equivalent, for purposes of entrance or matriculation, to an examination named in the list of examinations recognised by the Council (Section 2).

7. The Council will recognise the Final Examinations for Degrees in Arts or Science of any University of Great Britain or Ireland or of the British Dominions.

8. The registration of medical students shall be placed under the charge of the Branch Registrars.

9. Each of the Branch Registrars shall keep a register of medical students.

10. The Branch Registrar shall enter the student's name and particulars in the Students Register, and give him a certificate of such registration.

11. Each of the Branch Registrars shall supply to the several licensing bodies, medical schools, and hospitals, in that part of Great Britain or Ireland of which he is Registrar, blank forms of application for the registration of medical students.

12. A copy of the Medical Students Register prepared by each of the Branch Registrars shall be transmitted, on or before Dec. 31st in each year, to the Registrar of the General Council, who will distribute the list to the licensing bodies, medical schools, and hospitals.

All applications for special exceptions to the foregoing regulations as to registration shall be addressed to the Registrar of the General Council, and shall be decided by authority of the Education Committee, who shall report thereon to the Council.

MEDICAL SCHOOLS AND COLLEGES

The Universities, including their Colleges and Medical Schools, and Schools of Medicine at which Medical Study may be commenced in the United Kingdom are set out seriatim in the following pages.

Medical Registration in Ireland

By legislative agreement between the Governments of Great Britain, of the Irish Free State, and of Northern Ireland—the powers and duties of the General Council of Medical Registration and Education are continued as heretofore in respect of qualifying bodies in the Irish Free State, and of medical practitioners qualified in the Irish Free State. Side by side with this a Medical Council has been set up in the Irish Free State with the duty of establishing and controlling a Register for the Irish Free State. Practitioners whose names are on the General Register, and persons who pass a qualifying examination in the Irish Free State, will be registered on the Irish Free State Register on payment of the prescribed fee. The Irish Free State Medical Council have, over those whose names are on the Irish Free State Register, the same disciplinary powers as are possessed by the General Council over those whose names are on the General Register. To possess the privileges of a qualified practitioner in the Irish Free State it is necessary to be registered in the Irish Free State Register.

The net result of the change in the law as regards the practitioner qualifying in the Irish Free State in the future is that: (1) if he intends to practise only in the Irish Free State he need only register in the Irish Free State Register; (2) if he intends to practise in Great Britain he will register in the General Register; and (3) if he is in doubt where he will practise he will register in both Registers. He will, as he registers in one Register, or in both Registers, put himself under the disciplinary control of the one Council or of both Councils. No practical inconvenience is caused, and practitioners qualified in the Irish Free State in future will not find themselves deprived of any former privileges or rights.

Dental Board of the United Kingdom

Anyone who is on the Medical Register is entitled to practise as a dentist, although he cannot register as such without a degree or licence in dentistry; but it is a distinct advantage to take a special dental qualification, otherwise few dental appointments at general or special hospitals or dispensaries are available, and, unless the practitioner is on the Dentists Register, no work can be undertaken under the National Health Insurance (Dental Benefit) Regulations.

Under the Dentists Act, 1921, the powers and duties of the General Medical Council under the Dentists Act, 1878, and under the Medical Act, 1886, which related to the keeping of the Dentists Register and the administration of the Dentists Acts were largely transferred to the then newly constituted Dental Board of the United Kingdom. The registration of dental students at the commencement of their dental studies, and the power to erase a name from the Dentists Register, remain with the Council, but the inquiry into disciplinary cases rests with the Board, upon whose findings the Council acts.

The Dental Board consists of a chairman and 12 members. The chairman is appointed by the Privy Council. Other members of the Board are appointed by the Minister of Health, the Department of Health for Scotland, the Governor of Northern Ireland, the General Medical Council (3), four members are elected as representatives by the dentists possessing degrees or Licentiate in Dentistry and practising in England and Wales, Scotland, and Ireland, and two by dentists registered under the Dentists Act, 1921.

REGISTRATION OF DENTAL STUDENTS

The General Medical Council's Regulations in regard to the registration of dental students have recently been revised. The new regulations come into force on Oct. 2nd, 1933, and provide that the registration of dental students shall be carried on at the General Medical Council Office in London, in the same manner as that of medical students, and be subject to the same regulations as regards age and preliminary examinations; but professional study may commence either at a recognised dental hospital or school, or by pupilage with a registered dental practitioner.

Candidates for a diploma in dental surgery should produce certificates of having been engaged for at least four years in professional studies, and of having received during 24 calendar months instruction in dental mechanics. It is recommended that instruction in dental mechanics be taken at a recognised dental hospital and school. If any part of such instruction be taken by the candidate as a pupil with a registered dental practitioner, the time required to be devoted to it shall be at least twice the time required for the corresponding instruction taken at a dental school. Two years' bona-fide apprenticeship with a registered dental practitioner, after registration as a dental student, may be counted as one of the four years of professional study. When a student can show evidence of regular pupilage for not less that two years in dental mechanics to a registered dentist, prior to the passing of the prescribed preliminary and scientific examinations, he may antedate his registration for a period not exceeding one year prior to the passing of these examinations.

Offices

The address of the Registrar, to whom further communications should be addressed, is as follows: The Registrar of the General Medical Council, 44, Hallam-street, Portland-place, London, W.1. The offices of the Dental Board are at the same address.

A memorandum on the procedure to be adopted by those who desire to enter the profession of medicine, with notes on costs and prospects, and a similar memorandum in regard to dentistry, may be obtained on payment of 1s. each.

MEDICAL EXAMINING BODIES AND SCHOOLS IN ENGLAND AND WALES *

UNIVERSITY OF OXFORD

THERE are two degrees in Medicine, *B.M.* and *D.M.*, two in Surgery, *B.Ch.* and *M.Ch.*, and a diploma in *Ophthalmology*. The examinations are open to men and women alike.

Only Graduates in Arts of the University are eligible for the Medical and Surgical degrees. The most convenient course for the B.A. degree for intending graduates in Medicine is to take Responsions, the Preliminary Science Examinations mentioned below, and the Final Honour School of Physiology. To obtain the degrees of B.M. and B.Ch. the following examinations must be passed: 1. Preliminary subjects: Physics and Chemistry, Zoology, and Botany. 2. Professional. (*a*) First Examination: Subjects—Organic Chemistry, unless the candidate has satisfied the examiners in Part I. Chemistry in the Honour School of Natural Science; Human Physiology, unless he has obtained a First or Second Class in Animal Physiology in the Honour School of Natural Science; Human Anatomy. (*b*) Second Examination: Subjects—Medicine, Surgery, Midwifery, Pathology, Forensic Medicine and Public Health, Materia Medica and Pharmacology. The First and Second Professional examinations are held in June and December. The First B.M. Examination may be passed at any time after the Preliminary Scientific examinations. Anatomy and Physiology must be passed at the same time—Organic Chemistry may be taken separately.

At any time after passing *First B.M. Examination*, the candidate can, on producing certain certificates, present himself for examination in the subjects of Pathology, Forensic Medicine and Public Health, Materia Medica and Pharmacology; but cannot, unless he is already a registered medical practitioner, enter for Examination in Medicine, Surgery, and Midwifery, until the eighteenth term from his matriculation, nor until a period of at least thirty-three months has elapsed from the date of passing the First B.M. Examination. He must pass in Medicine, Surgery, and Midwifery at one and the same time.

Before admission to the Examinations in Pathology and Bacteriology, and Materia Medica and Pharmacology, of the *Second B.M. Examination*, the student must produce certificates of having attended courses of instruction including practical work in Pathology, Bacteriology, Post-mortem Clerking, and Pharmacology, either in Oxford or in another recognised Medical School. Before admission to the remainder of the Second B.M. Examination, he must produce a number of other certificates, including evidence of having acted as Clinical Clerk and Dresser, each for six months in the Wards, of instruction in Midwifery and of attendance on Labours, of instruction in Infectious Diseases and in Ophthalmology, of proficiency in Vaccination and in the administration of Anæsthetics, and of three academic years of hospital practice.

The degree of Bachelor of Surgery (B.Ch.) is granted with that of B.M. after passing the above examinations.

The degree of Doctor of Medicine (D.M.) is granted to Bachelors of Medicine of the University who have entered upon their thirtieth term from Matriculation, and have submitted a dissertation which is approved by judges appointed for the purpose by the Board of the Faculty of Medicine. The degree of Master of Surgery (M.Ch.) is granted after examination to Bachelors of Surgery who have entered upon their twenty-first term, and who are members of the surgical staff of a recognised hospital, or have acted as dresser or house surgeon in such a hospital for a period of six months. The examination, which includes Surgery, Surgical Anatomy and Pathology and Surgical Operations, is held annually in June, after the Second B.M. Examination.

Travelling Fellowship, Scholarships, and Prizes.—A Radcliffe Travelling Fellowship is awarded annually after an examination held in February. It is tenable for two years and of the annual value of £300. The examination is in Physiology, Pathology, and Hygiene, and is partly "practical." Candidates must be graduates in Medicine of the University. The holder must travel abroad for the purpose of medical study. Application should be made to the Radcliffe Examiners, Department of Medicine, University Museum. A Schorstein Research Fellowship of the value of £200 a year, tenable for two years, is offered in alternate years. Candidates must be graduates of the University, under 35 years of age, and must hold a registrable medical qualification. Their research must be carried out in one of the Medical Departments at Oxford. A Christopher Welch Scholarship of usually £200, tenable for four years, is awarded annually after examination. Candidates must be men undergraduate members of the University, who have not exceeded the twelfth term from their matriculation, or been admitted to any degree in the University. They may offer any one of the subjects, Animal Physiology, Botany, Zoology. A George Herbert Hunt Travelling Scholarship of the value of about £100 is awarded every second year to enable a Bachelor of Medicine to undertake three months' study abroad. A Rolleston Memorial Prize is awarded once in two years to members of the Universities of Oxford and Cambridge of not more than ten years' standing for an original research in some Biological subject, including Physiology or Pathology. The Radcliffe Prize, founded by University College (1907), is of the value of £50 and is awarded biennially (alternating with the Rolleston Memorial Prize) for research in some branch of medical science. The Theodore Williams Scholarships, each of the value of £50 a year for two years, are awarded annually in the subjects of Anatomy, Physiology, and Pathology. A Radcliffe Scholarship in Pharmacology, of the value of £50 for one year, is awarded annually by the Master and Fellows of University College. Scholarships at certain London hospital medical schools are awarded each year on the nomination of the Regius Professor of Medicine or of the Dean of the Medical School. The Scholarships and Exhibitions in Science which are offered by most Colleges are open to those who intend to pursue Medicine. The value of these scholarships varies, according to the candidate's need, between £30 and £100 a year; the exhibitions vary in value from £30 to £100 per annum. The number of scholarships and exhibitions in Science offered annually is about forty. There are also Medical Scholarships of the value of £100 a year at University College and at Pembroke College. The Welsh Memorial Prize for Anatomical drawing is awarded annually, and is of the value of about £10.

More detailed information may be obtained from the University Calendar; from the Examination Statutes, 1932–33; from the Regius Professor of Medicine; from the Professors in the departments of medical science; and from the Dean of the Medical School, Oxford, Department of Medicine, University Museum, Oxford.

Radcliffe Infirmary and County Hospital

There are 305 beds. Courses of instruction are given in connexion with the Oxford University Medical School. These include (1) a course in Practical Medicine by the Regius Professor of Medicine; (2) clinical lectures by the Litchfield Lecturers in Medicine and Surgery; (3) tutorial instruction and demonstrations in special Regional Anatomy (medical and surgical), methods of Medical and Surgical Diagnosis, and Surgical Manipulation; and (4) pathological demonstrations and instruction in post-mortem work are given by the Pathologist. Opportunities are offered to students who wish to act as surgical dressers and clerks. A post-graduate course is held in the hospital in the autumn of each year.

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* For special diplomas see p. 507.

UNIVERSITY OF CAMBRIDGE

There are two degrees in Medicine, *M.B.* and *M.D.*, two in Surgery, *B.Chir.* and *M.Chir.*, and a Diploma in *Medical Radiology and Electrology.* Students of Girton or Newnham College are admitted to the examinations for these degrees and the diploma.

The student must enter a College, or become a Non-Collegiate student, and keep nine terms (three years) by residence. He must pass the Previous Examination of the University before he comes into residence or therefrom obtain exemption, particulars of which may be obtained from the Registrary. He may then devote himself to medical study in the University. Or he may, as nearly all students now do, proceed to take a degree in Arts by passing the Examinations for the Ordinary B.A. degree, or an Honours degree by passing one or more Tripos Examinations. The Natural Sciences Tripos is taken most frequently by medical students, as some of the subjects are practically the same as those for the First and Second M.B. Examinations.

For the degree of Bachelor of Medicine (M.B.) five calendar years of medical study are required either in Cambridge or at one of the recognised Schools of Medicine. The first three years are spent in Cambridge till the student has passed the examination for Part I. of the Natural Sciences Tripos and the *First and Second M.B. Examinations.* Hospital practice may be attended at Addenbrooke's Hospital, Cambridge, after the student has passed Parts I. and II. of the *Second Examination.* The laboratories for Botany, Chemistry, Physics, Biology, Zoology, Human Anatomy, Physiology, Biochemistry, Pathology, Bacteriology, Pharmacology, and Psychology are well equipped. Addenbrooke's Hospital, the Infectious Diseases Hospital, the Cambridge Research Hospital, and the Field Laboratories are utilised for study and research.

There are three examinations for M.B. The *First* includes (1) General and Inorganic Chemistry, (2) Mechanics, (3) Physics, and (4) Elementary Biology. These parts may be taken together or separately. The *Second* is divided into three parts—viz. (1) Organic Chemistry, (2) Human Anatomy and Physiology, and (3) Pharmacology and General Pathology. The *Third* is divided into two parts: (1) Principles and Practice of Surgery (including Special Pathology and Midwifery and Diseases Peculiar to Women); and (2) Principles and Practice of Physic (including Diseases of Children, Mental Diseases, Medical Jurisprudence), Pathology (including Hygiene and Preventive Medicine), and Pharmacology (including Therapeutics and Toxicology). The examinations are partly in writing, partly oral, and partly practical, in the hospital, in the dissecting room, and in the laboratories. An Act has then to be kept by the candidate reading an original dissertation composed by himself and being examined orally on some subject approved by the Regius Professor of Physic. Candidates who have passed both parts of the Third M.B. Examination are admitted to the registrable degree of Bachelor of Surgery (B.Chir.) without separate examination and without keeping an Act.

The degree of Doctor of Medicine (M.D.) may be taken three years after that of M.B. or four years after that of M.A. The candidate is required to produce certificates of having been engaged in Medical Study for five calendar years, and if an M.A. to pass the same examinations as are required for the degree of M.B. An Act has to be kept, consisting of an original Thesis with *viva voce* examination; and a short extempore essay has to be written on a topic taken from the general subject of his thesis, whether it be Physiology, Pathology, Pharmacology, the Practice of Medicine, State Medicine, or the History of Medicine.

Candidates for the Degree of Master of Surgery (M.Chir.) who are M.A.'s may be admitted to the examination after they have become legally qualified under the *Medical Acts* to practise surgery. Others may be admitted to the examination when two years at least have elapsed after they have completed all that is required of candidates for the Degree of B.Chir. Candidates are required to pass an examination in Principles and Practice of Surgery, Surgical Anatomy and Surgical Operations, and Pathology, and to write an extempore essay on a Surgical Subject. (The examination is held in February.)

A Diploma in Medical Radiology and Electrology is granted. Candidates must hold a recognised medical qualification.

Scholarships and Prizes.—Medical studies are endowed by the numerous Natural Science scholarships at the various colleges, information about which can be obtained from the respective Tutors. There are Natural Science scholarships at most of the Colleges and prizes in the ancillary medical subjects. Some of these are entrance scholarships; some may be gained by students already in residence, and where suitable candidates are not forthcoming among such students the emoluments may be allotted to members of other Colleges. Valuable scholarships instituted on behalf of Medicine are the Tancred Studentships in Physic, tenable at Gonville and Caius College. The successful candidates must enter at the college within a month or remove there if they are members of any other college. Students are required to take the degree of M.B. as soon as they are of sufficient standing but may hold a Studentship for a further three years. Thus a student elected previous to admission to college can draw the emolument, the annual value of which is about £100, for eight years. Full particulars can be obtained from Mr. E. T. Gurdon, 28, Lincoln's Inn-fields, London. Among other scholarships and prizes may be mentioned the Balfour Studentship, for research in Biology, of the value of £300 a year for three years, not restricted to members of the University; the Frank Smart Studentship and Prizes for Botany and Zoology, and the Shuttleworth Studentship for Zoology or Physiology tenable at Gonville and Caius College. The one University prize in Medicine, the Raymond Horton Smith Prize, is awarded to that candidate for the degree of M.D. who presents the best thesis for the degree during the academical year, provided that he has taken honours in a Tripos Examination. The E. G. Fearnsides Research Scholarship and several very valuable studentships are also awarded.

An abstract of the Regulations and Schedules of the range of the examinations in Chemistry, Mechanics, Physics, Biology, Pharmacology, and General Pathology may be obtained upon application to the Registrary, The Registry, Cambridge.

A scheme for the formation of a Medical Sciences Tripos as a remedy for the overlapping between the studies for the M.B. degree and those for the existing Natural Sciences Tripos was endorsed two years ago by the Syndicate. This body has now reconsidered their opinion, and a Medical Sciences Tripos will not be instituted. But agreement has been reached between the Syndicate and the Natural Sciences Tripos Committee whereby the substance of the proposal for a Medical Sciences Tripos can be incorporated in the Natural Sciences Tripos. The report on the subject was published substantially in THE LANCET of July 8th, p. 95.

Addenbrooke's Hospital

267 beds. Clinical lectures in medicine and surgery, in connexion with Cambridge University medical school, are given at this hospital during the academical year; and practical instruction in medicine and surgery is given in the wards and out-patients' rooms by the physicians and surgeons daily during the term time and vacations.

UNIVERSITY OF LONDON

The University of London was constituted in 1836, reconstituted under the Act of Parliament, 1898, as a teaching as well as an examining body, and again reconstituted under Act of Parliament, 1926. All the metropolitan medical schools are constituent colleges, while Clinical Units have been established at St. Bartholomew's, the London, St. Mary's, St. Thomas's, University College Hospital, and the Royal Free.

A revision of the medical curriculum is in prospect. The Senate of the University has invited representatives of the Universities of Oxford and Cambridge and of the English Royal Colleges to meet in conference representatives of the Medical Faculty of the University with a view to devise constructive measures in remedy of difficulties which have been widely known to exist in London or elsewhere.

Internal and External Students.—All the examinations of this University are open to men and women alike. Matriculated students of the University may be either internal or external. Internal students of the University are students who are registered as pursuing a prescribed course of study, or an approved course of research, in a school of the University, or under teachers of the University. Centres for preliminary and intermediate medical studies have been established by the University at University and King's Colleges. External students in addition to matriculating must register as preparing for an examination leading to a Degree or Diploma within the purview of the Council for external students.

University College

University College has been constituted a University centre for the teaching of medical sciences. The College Faculty of Medical Sciences comprises the departments of physics, chemistry, botany, and zoology (the Preliminary Medical Sciences); also the departments of anatomy and embryology, physiology and biochemistry and pharmacology (the Intermediate Medical Sciences). Post-graduate and research work is undertaken in all departments. The completion of the building scheme by the erection of the section for anatomy, histology, and embryology, together with further extensions to the department of physiology and biochemistry and new accommodation for the department of zoology which the generosity of the Rockefeller Foundation made possible, provides exceptional facilities for research and post-graduate study. The opportunities for investigation in human and comparative embryology and neurology, in histology, radiology, anthropology, biochemistry, and experimental physiology and embryology may be mentioned. In the department of zoology and comparative anatomy, the study of genetics accompanies that of comparative physiology and animal behaviour. Arrangements exist for the close correlation of the work of the Faculty with University College Hospital and Medical School. Women students are admitted.

Scholarships and Prizes.—The first four items on the present list require a complete intermediate course at University College. The money value and subjects at examinations are as follows: (*a*) Bucknill Scholarship, 160 guineas; (*b*) and (*c*) two Entrance Exhibitions, 55 guineas each, Chemistry, Physics, Botany, and Zoology; (*d*) Entrance Scholarship, £30 a year for three years; (*e*) Ferriere Scholarship, £25 for three years, tenable at University College Hospital Medical School, awarded to a student who has done his Anatomy and Physiology at University College and has completed the 2nd Medical Examination. (*f*) Cluff Memorial Prize, £15 biennially, Anatomy, Physiology, Pharmacology, and Chemistry; (*g*) Schafer Prize in Physiology, £18 triennially; (*h*) Sharpey Physiological Scholarship, £115. Biological Sciences; (*i*) Bayliss-Starling Scholarship, £120 a year, Physiology. Biochemistry; (*j*) Percy F. Macgregor Scholarship in Embryology, £50; (*k*) Morris Bursary for sons of deceased professional men, by nomination, tenable for two years, £20 a year; and (*l*) two Gold Medals awarded annually in Anatomy or Physiology. For further information apply to the Secretary, University College, Gower-street, London, W.C.1.

King's College

The Medical Faculty at this College of the University gives instruction in the subjects of Medical Science for all the usual Preliminary and Intermediate Examinations in Medicine and Surgery. Through the four associated hospitals, students of the College have clinical facility of over 1000 beds, but they may also proceed to any other teaching hospital in London for final studies for the degrees of the University.

The Medical Faculty of the College provides a general University education in touch with other Faculties, classes of which medical students are permitted to attend. There are many College societies, clubs, and functions, in which students of all faculties have opportunity of meeting each other. The College has a large athletic ground at Mitcham, upon which is a new pavilion.

The First Year subjects are taught in the large Departments of the Faculty of Science and those for the Second and Third Years in the new Medical Department which was opened recently, consisting of the Hambleden Department of Anatomy and an extension to the department of physiology, at a cost of £70,000. These new buildings and those of recent years, provide the College with a completely new and modern Medical Department which embodies the newest ideas in laboratory construction and equipment.

Scholarships and Prizes.—Two or more Warneford Entrance Scholarships of £30 each for four years. Examination in April, subjects selected from Divinity, Classics, Science. Sambrooke Scholarship of £30 for three years. Examination in April, subjects selected from Classics, Science. Worsley Scholarships: £100 in five annual instalments of £20. *At the end of the First Year* of study, the Rabbeth Scholarships (£30 and £15), the Carter Gold Medal and Prize in Botany, and the Hare Prize in Zoology are open for competition. *At the end of the Third Year*, the Hughes Prize in Anatomy, the Huxley Prize in Physiology, the Inchley Prize in Pharmacology, and the Jelf Medal are open for competition. The Layton and the Berridge Research Studentships (£150 per annum each), the Daniell Scholarship in Chemistry (£40), Warneford Prizes (£25 and £15), Leathes Prize, Barry Prize, &c., are also open to Students of this Faculty. The majority of the Scholarships and Prizes are open to Regular Students only. For information apply to the Dean of the Medical Faculty.

THE MEDICAL FACULTY OF THE UNIVERSITY

Medical students of the University of London, who are pursuing their medical curriculum in the metropolis will proceed to one of the recognised medical schools connected with the University. At four of these schools the preliminary studies will be taken at King's College, while at the other schools the whole curriculum can be taken out in connexion with the selected hospital. These hospitals are St. Bartholomew's Hospital, Charing Cross Hospital, St. George's Hospital, Guy's Hospital, King's College Hospital, the London Hospital, St. Mary's Hospital, the Middlesex Hospital, St. Thomas's Hospital, University College Hospital, Westminster Hospital, and the London (Royal Free Hospital) School of Medicine for Women. Various schools and hospitals are also recognised as schools of the University in special departments, and students may pursue their studies at other approved universities and medical schools, presenting themselves for examination at the University.

The Faculty of Medicine of the University grants the joint degrees of M.B., B.S. (*Bachelor of Medicine and Surgery*), the higher separate degrees of M.D. (*Doctor of Medicine*) and M.S. (*Master of Surgery*), and the degree of B.D.S. (*Bachelor of Dental Surgery*) and the degree of B.Pharm. (*Bachelor of Pharmacy*); the two higher degrees being open only to candidates holding the M.B., B.S. degrees of the University. The curriculum for the M.B., B.S. degrees is five and a half years from the time of matriculation, with certain exceptions which must be looked for in the official regulations of the University.

A. *Internal Students.*—For the Bachelor's degrees in Medicine and Surgery a student must normally, after registration as an internal student, have: (1) Attended prescribed courses of study for five and a half years in one or more schools of the University. (2) Passed the following examinations, under the conditions mentioned below: (*a*) The First Examination for Medical Degrees in Inorganic Chemistry, Physics, including Mechanics, and General Biology; (*b*) the Second Examination for Medical Degrees: Part I., Organic Chemistry; Part II., Anatomy, Physiology, and Pharmacology; (*c*) the Third Examination for Medical Degrees, or M.B., B.S. Examination in Medicine, Surgery, Obstetrics and Gynæcology, Pathology, Forensic Medicine, and Hygiene.

B. *External Students.*—For the Bachelor's degrees in Medicine and Surgery an external student must (1) have passed the Matriculation examination or have been exempted therefrom not less than five and a half years previously; (2) have passed subsequent examinations similar to those required of an internal student; and (3) have been engaged in professional studies during the five and a half years subsequently to Matriculation and four and a half years subsequently to passing the First Examination for Medical Degrees at one or more of the medical institutions or schools recognised by this University for the purpose, one year at least of the four and a half years to have been spent in one or more recognised institutions or schools in the United Kingdom.

The First Examination for Medical Degrees (Inorganic Chemistry, Physics, including Mechanics, and General Biology) will take place twice in each year commencing on the Monday following Dec. 5th and on the first Monday in July. It must be passed not less than nine months after matriculation.

The Second Examination for Medical Degrees (Part I.): Organic Chemistry.—This examination will take place twice in each year, commencing on the Thursday following the second Monday in March and on the Thursday following the first Monday in July. No candidate will be admitted to this examination until he has completed the First Examination.

The Second Examination for Medical Degrees (Part II.) takes place twice in every year, commencing on the Tuesday following the third Monday in March and on the Tuesday following the first Monday in July. No candidate shall be admitted to the examination unless he has passed the First Examination for Medical Degrees at least 18 months previously, and has passed Part I. of the Second Examination for Medical Degrees.

The Third or M.B., B.S. Examination.—The M.B., B.S. examination takes place twice in each year, commencing on the second Monday in November and on the first Monday in May. No candidate will be admitted to this examination unless he has completed the Second Examination for Medical Degrees, together with a course of study summarised below, nor within three years from the date of passing the Second Examination, Part II., in Anatomy and Physiology. The course of study comprises introductory course in (1) Clinical Medicine; (2) Clinical Surgery; (3) Clinical Pathology; (4) Experience as Clinical Clerk; (5) Clinical Medicine; (6) (*a*) Fevers, (*b*) Children's Diseases, (*c*) Venereal Diseases, (*d*) Mental Diseases (at a recognised Asylum), (*e*) Dermatology, (*f*) Vaccination, (*g*) Materia Medica and Pharmacy; (7) Experience as a Surgical Dresser; (8) Clinical Surgery; (9) Ophthalmology; (10) Oto-Rhino-Laryngology; (11) (*a*) Operative Surgery, (*b*) Applied Anatomy, (*c*) Administration of Anæsthetics, (*d*) Dental Surgery, (*e*) Orthopædic Surgery, (*f*) Mechano-therapeutics; (12) Obstetrics and Gynæcology; (13) Lying-in Hospital; (14) The conduct of at least 20 Labours; (15) Antenatal Clinic; (16) Experience as a Clinical Clerk in Gynæcological Work; (17) General Pathology, Morbid Anatomy, Bacteriology, and Chemical Pathology; (18) Work in the Post-mortem Room; (19) Clinical Laboratory; (20) Forensic Medicine; (21) Hygiene. He must have attended the Medical and Surgical Practice of a recognised hospital for two years, and have held the posts of clinical clerk and surgical dresser for periods of six months each. Candidates will be examined in Medicine, Pathology, Forensic Medicine and Hygiene, Surgery, Obstetrics, and Gynæcology. The subjects may be divided into two groups—namely: (1) Medicine, Pathology, Forensic Medicine, and Hygiene; and (2) Surgery, Obstetrics, and Gynæcology, and may be taken either separately or together.

Doctor of Medicine.—The examination for this degree takes place twice in each year, commencing on the second Monday in December and on the first Monday in July. Candidates may present themselves for examination in one of the following branches—namely: (1) Medicine; (2) Pathology; (3) Psychological Medicine; (4) Midwifery and Diseases of Women; (5) State Medicine; and (6) Tropical Medicine. Any candidate for the degree of M.D. (except in branch 5) may transmit to the Registrar a thesis for approval and may be exempted from a part or from the whole of the written examination.

Master of Surgery.—The examination for the degree of Master of Surgery takes place twice in each year: (1) Surgery; (2) Dental Surgery; (3) Ophthalmology; (4) Laryngology, Otology, and Rhinology. A thesis may be submitted as for M.D.

Doctor of Philosophy.—A Degree of Ph.D. has been instituted in non-clinical subjects for Internal and External Students in the Faculty of Medicine. Candidates for this degree must hold, in a branch of study akin to that in which they propose to proceed to the Ph.D. Degree, the Degree of M.B., B.S., or B.D.S., or B.Pharm., or B.Sc.

Bachelor of Pharmacy.—The course extends over three years.

Full details of the prescribed curricula can be obtained free on application to the Academic Registrar, or for External Degrees from the External Registrar, University of London, South Kensington, S.W. 7.

MEDICAL SCHOOLS OF THE UNIVERSITY OF LONDON[1]

St. Bartholomew's Hospital and College

The hospital contains 762 beds, of which 692 are for patients in the hospital at Smithfield and 70 at the Alexandra Hospital, Swanley. Special departments have been organised for diseases of women and children, the eye, ear, larynx, and skin, as well as for orthopædic and dental surgery, and for electro-therapeutics and X ray work. Whole-time Clinical Units under professors of medicine and surgery have been established. A new surgical block of ten wards, with accommodation for 250 patients, and connected with a block of five new operation theatres is now in use.

Ten house physicians and ten house surgeons are appointed anually, are provided with rooms and board, and receive £80 a year as salary. A resident midwifery assistant, an ophthalmic house surgeon, and a house surgeon for diseases of the throat, nose, and ear, and a house surgeon for orthopædic surgery are appointed every six months, and are provided with rooms and board and receive a salary of £80 a year. Three resident administrators of anæsthetics are appointed, the senior for one year at a salary of £150, and two juniors for six months with a salary at the rate of £80 per annum, with board and rooms. An extern midwifery assistant is appointed every three months, and receives a salary of £80 a year. The clinical clerks, the obstetric clerks, the clerks to the medical out-patients, the dressers to the surgical in-patients and to the out-patients, and the dressers in the special departments are chosen from the students.

There are quarters for the resident staff, casualty, medical, surgical, and special out-patient departments, casualty wards, dispensary, and clinical lecture theatre. There is a chemical laboratory attached to the College as well as a laboratory devoted to instruction in public health. A block is devoted to pathology, and contains the post-mortem room as well as extensive laboratories for bacteriology, clinical pathology, and pathological chemistry. *The Medical College Buildings* include three large lecture theatres, a large dissecting-room, laboratories for chemistry, biology, morbid anatomy and histology, and public health, as well as a spacious library (containing 14,500 volumes), a well-appointed museum of anatomy, physiology, comparative anatomy, materia medica, botany, and pathological anatomy. The pathological museum is complete. A new block in Giltspur-street has recently been acquired and has been fitted up as lecture theatres and laboratories for physics, chemical physiology, experimental physiology, histology, and pharmacology.

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[1] Of these schools that of the Royal Free Hospital is reserved for women; University College and King's College admit men and women, both of them limiting the number of women when clinical work is reached: the remainder admit men only. Further information can be obtained from the respective Deans of the schools.

The College has recently bought the site and buildings in Charterhouse-square (five minutes' walk from the Hospital), formerly occupied by The Merchant Taylor's School, and the whole of the preclinical departments will shortly be transferred there.

Special Classes for the Primary and Final F.R.C.S. Examinations are held twice yearly. *Instruction in Preliminary Science* is given to University of London students in chemistry, biology, and physics throughout the year. Facilities for research work are afforded in the Clinical Units and laboratories of pathological and other departments. *Vacation Anatomy Courses* are given in spring and summer.

Scholarships given in aid of Medical Study.—Six Entrance Scholarships and Exhibitions are awarded annually—viz.: (1) and (2) a Scholarship of £100 and an Exhibition of £60 in any two of the following subjects: Human Anatomy and Embryology, Physiology, Pathology (including Bacteriology), Biochemistry; (3) a Scholarship of £100 in Chemistry, Physics, and Biology; (4) and (5) a Scholarship of £100 and the Jeaffreson Exhibition of £50 in Mathematics, Latin, or Greek or French or German, a second Language or Chemistry or Physics; (6) the Shuter Scholarship of £50 in Anatomy and Physiology, which is awarded after competitive examination among Cambridge Graduates. The more important of the other Scholarships and prizes are as follows: Four Junior Scholarships—(7) No. 1, £30, Anatomy and Physiology; (8) No. 2, £20, Anatomy and Physiology; (9) No. 3, £25, Chemistry, Physics, and Biology; (10) No. 4, £15, Chemistry, Physics, and Biology; (11) Senior Scholarship, £50, Anatomy, Physiology, and Chemistry; (12) Kirkes Scholarship, £30 and medal, Clinical Medicine; (13) and (14) two Brackenbury Scholarships, £39 each, one in Medicine and one in Surgery; (15) Sir G. Burrows Prize, 10 guineas, Pathology; (16) Skynner Prize, 13 guineas, Regional and Morbid Anatomy; (17) Matthews Duncan Medal and Prize, £20, Midwifery and Gynæcology; (18) Luther Holden Research Scholarship in Surgery, awarded by election, £105; (19) Lawrence Research Scholarship and Gold Medal in Pathology, awarded by election, £115; and (20) Baly Scholarship in Clinical Medicine, £75, awarded by examination.

The recreation ground of 10 acres, for the use of the members of the Students' Union, is at Winchmore Hill. The Union's premises at the Hospital contain a large reading and smoking room, a committee and writing room, luncheon and dining hall, and a miniature rifle range. Athletic amenities are also available on the new site in Charterhouse-square.

Charing Cross Hospital

The Hospital, to which the School is attached, contains 300 beds. There are special departments for mental diseases, midwifery, diseases of women, of children, of the skin, ear, throat, nose, and teeth, for orthopædic cases, X ray work, and for electrical treatment. In the medical school demonstratorships and assistant demonstratorships are open to students of the school. Eight house physicians, six house surgeons, two obstetric and gynæcological house surgeons, six house surgeons to the special departments, two resident anæsthetists, and four clinical pathologists are appointed annually. The following appointments are open to students after they have held resident appointments: resident medical officer, at a salary of £400 per annum; resident casualty officer, at £200 per annum; and five registrars to the medical, surgical, obstetrical, and ear, nose, and throat departments, at £150 per annum each.

Primary and Intermediate students receive their lectures and practical work at King's College, and final studies are taken in the school and hospital, where systematic lectures, demonstrations, and tutorial classes are arranged in general and special subjects.

In the Institute of Pathology, under a whole-time staff of scientific workers and in fully equipped laboratories, students receive their training in preventive medicine, pathology, and bacteriology. There are special facilities for research, and post-graduate teaching is available. The course in practical ophthalmology is given in the Royal Westminster Ophthalmic Hospital. Courses in general medicine, surgery, and pathology, with the requisite clinical work in the wards and out-patient departments, are provided for students reading for dental qualifications.

The pathological museum, containing over 4000 specimens and 3000 histological preparations, comprises (1) the section on general pathology, and (2) the Cuthbert Lockyer Collection of over 1150 gynæcological and obstetrical specimens. The library contains 3950 volumes including the latest editions of text-books.

The Students' club, with smoking and luncheon rooms on the school premises, cloak room, telephone, &c., provides for the social comfort and convenience of the students. The club is controlled by a committee of students, and includes the Medical Society and the Dramatic Society. The *Gazette* is published quarterly. The sports ground, of 8 acres, at Colindale affords facilities for Rugby and Association football, cricket, hockey, and tennis (hard and lawn courts). In addition there are sections of the club devoted to athletics, boxing, swimming, golf, and badminton.

Scholarships.—The following are offered annually: (*a*) for students commencing medical studies—two scholarships, each of the value of £50; (*b*) for students commencing clinical studies—two "University" scholarships, each of the value of £120, in Pathology; one "University" scholarship, value £120, and one "Open" scholarship, value £75, in Anatomy and Physiology. In addition there are a number of Exhibitions.

Prizes.—The following prizes are offered: (1) "Llewellyn" Prize, £25, for highest distinction throughout the final course of studies; (2) "William Travers" Prize, £15; (3) "J. H. Morgan" Prize, £10; other prizes in money are the "Pereira," "T. H. Green," and "Steadman," while prizes in money are offered for proficiency in clinical medicine and surgery, and all the different subjects of the curriculum.

St. George's Hospital

This hospital has a service of 436 beds, of which 180 are allotted to surgical, 150 to medical cases, and 100 are at the Convalescent Hospital at Wimbledon. There are all the usual special clinical departments. One ward is set apart for diseases peculiar to women, and there is a maternity ward of 11 beds. Children's beds are placed in the women's wards. There are two ophthalmic wards.

Eight house physicians, eight house surgeons, and eight casualty officers are appointed annually. Special attention is directed to the following paid appointments, among others, which are open to students after they have held house office: resident assistant physician and resident assistant surgeon at £250 per annum each; medical officer to the Atkinson-Morley Convalescent Hospital at £300 per annum;

medical registrarship at £200 per annum; surgical registrarship at £200; assistant curatorship of the museum at £100; obstetric assistantship (resident) at £100; the post of resident anæsthetist at £100.

Entrance scholarships and endowed prizes of a total value of £973 may be awarded annually; a detailed list is placed below. The entire teaching and laboratories are now devoted to purely clinical subjects, and arrangements have been made with the authorities of King's College and University College for students who enter the first, second, or third year of the curriculum as students of St. George's to carry out the necessary courses of instruction at one of those Colleges. Students then complete their course, without payment of any entrance fee, in a school entirely devoted to clinical work.

Scholarships and Prizes.—At this school 11 entrance scholarships and exhibitions are given, the money value and the subjects of examination being as follows: (*a*) and (*b*) two William Brown Exhibitions, £120 and £80 respectively; (*c*) and (*d*) two Anne Selina Fernee Scholarships, £80 each; (*e*) Devitt-Pendlebury Scholarship, £40 (approx.); (*f*) and (*g*) two Anne Selina Fernee Exhibitions, £60 each, Anatomy and Physiology, except in the case of (*c*) and (*f*) subject of examination for which is General Pathology.

In addition to the above, Exhibitions each of the value of £40 and up to four in number may be awarded to candidates of approved merit in the Entrance Scholarships Examination. The others are as follows: (*h*) Allingham Scholarship in Surgery for Students qualified not more than two years, £87; (*i*) and (*j*) two Brackenbury Prizes, one in Medicine and one in Surgery, £33 each, open to students of not more than five years' standing; (*k*) H. C. Johnson Memorial Prize, £20, Practical Anatomy; (*l*) Pollock Prize, £24, Physiology, Physiological Chemistry, and Histology; (*m*) Clarke Prize, £5; (*n*) Thompson Medal, £9, Clinical Reports; (*o*) Brodie Prize, £8, Clinical Reports; (*p*) Webb Prize, open to perpetual pupils, £34, Bacteriology; (*q*) Sir Francis Laking Memorial Prize, £45, open to students having registrable qualifications.

The Library is fully stocked with the latest and best text-books. The Pathological Museum has recently undergone complete revision. In addition to its well-known specimens of great historical interest, it contains a complete range of pathological conditions, set out in such a way that the student can easily obtain the fullest information relating to any disease.

The St. George's Hospital Club, with smoking- and luncheon-rooms on the hospital premises and an athletic ground at Wimbledon, is an amalgamation of the Hunterian Society, the *Gazette*, and the Rugby football, cricket, lawn tennis, boxing, rifle, and golf clubs. Students have the advantage of a library of medical and scientific books which is kept up to date.

Guy's Hospital

The Medical School, which has been entirely rebuilt within recent years, provides ample accommodation with modern equipment for all the non-clinical subjects of the medical curriculum. The School is a constituent part of the University of London and offers a complete medical education of University standard throughout. The Hospital contains 646 beds, a total which is more than sufficient to provide the clinical material necessary to ensure that the students in the clinical period are given every opportunity to obtain a practical knowledge of clinical work. On commencing the clinical period, students are placed for three months under the charge of an experienced clinical tutor while they are given a preliminary course of instruction in methods of clinical examination. Thereafter they hold a series of appointments, each of three months' duration, in surgical, medical, and obstetrical and gynæcological wards. Students are signed up after each appointment by the members of the staff to whom they have been attached. The type of instruction is essentially practical and students are given a large amount of individual responsibility, *provided that they show* themselves worthy of it.

The following special departments are attached to the hospital: Departments of ophthalmology, laryngology, gynæcology, diseases of children, diseases of the nervous system, psychological medicine, dermatology, otology, actino-therapeutics, anæsthetics, dentistry, fractures, orthopædics, vaccine, tuberculosis, genito-urinary and venereal diseases, Salomon's Welfare Centre (for Maternity and Children). Dresserships and clerkships in the various special departments are held by students after they have completed their general medical and surgical and their obstetrical and gynæcological appointments.

There is a Venereal Clinic, in accordance with the scheme of the Local Government Board and London County Council. Lectures and clinical instruction are given, to which medical students and practitioners are admitted without fee.

House physicians, house surgeons, out-patient officers, assistant house surgeons, obstetric residents, house surgeons in the departments of ophthalmology, laryngology, and genito-urinary diseases, house physicians in the departments for neurology and dermatology and for diseases of children, and clinical assistants are appointed from among recently qualified students according to merit.

Scholarships.—Six Entrance Scholarships are awarded annually as follows: (*a*) one War Memorial Scholarship, of the value of £200, to be awarded alternately in Arts and Science (next award, April, 1934, in Science); (*b*) one Open Arts Scholarship of £100 for students under 19 years of age; candidates are required to take English and any two of the following subjects: Latin, Greek, French, German, and Mathematics; (*c*) one Open Junior Science Scholarship for students under 20 years, £100; subjects any three of the following: Inorganic Chemistry, Physics, Biology, and Mathematics; (*d*) a confined Junior Science Scholarship of the value of £100 is offered for competition, annually in June or July, to candidates who have attended the Preliminary Science Classes at this School; *(e) an additional Open Scholarship* is awarded every other year; (*f*) University Entrance Scholarships. These are (1) a War Memorial Scholarship of the value of £100, awarded annually in June or July; (2) an open exhibition of the value of £60, awarded annually in June or July, for students who have completed their examinations in Anatomy and Physiology in a British School or University outside the London Metropolitan area; subjects, any two of the following: Human Anatomy and Embryology, Physiology, Pathology including Bacteriology, Biochemistry. The examination is held in common with the Medical School at St. Thomas's Hospital and the Medical College of St. Bartholomew's Hospital. Two Entrance Scholarships are awarded annually in April as follows: (3) A War Memorial Scholarship in Arts of the value of £40 per annum for four years, open to students under 19 years of age. Candidates are required to take English and any two of the following subjects: French, German, Latin, Greek, and Mathematics. (4) A Science Scholarship of the value of £40 per annum for four years, open to students under 20 years of age. Candidates are required to take two of the following subjects: Chemistry, Physics, and Biology.

The Wills Library contains 10,000 volumes of standard text-books and books of reference.

The Museum contains specimens of Pathological Anatomy, amounting to upwards of 5000, supplemented by more than 2000 drawings. These illustrate the diseases of all the systems in the body, including Surgical, Obstetric and Gynæcological affections, and have recently been entirely remounted, arranged and catalogued, forming a collection unrivalled for its extent and educational value. In point of size it is second only to that of the Royal College of Surgeons. Here also is the famous collection of Wax Models made by the late Mr. Towne.

Within the grounds of the hospital are situated the residential college, with accommodation for 35 students, the students' club, with reading, smoking, luncheon, and dining-rooms, a squash court, a fives court, and swimming bath. The athletic ground and club house is situated at Honor Oak Park, and can be reached in 15 minutes from the hospital.

King's College Hospital

The final subjects in the curriculum are taught at the medical school of King's College Hospital, which is situated at Denmark Hill, S.E. 5.

The hospital has 384 beds, and provision will be made ultimately for 600. There are special departments for bacteriology, cardiology, children, clinical pathology, dermatology, gynæcology and obstetrics, laryngology, massage, medical chemistry, neurology, odontology, ophthalmology, orthopædics, otology, physical treatment, psychological medicine, radiology, rhinology, and urology, each in charge of a specialist and his staff. Ten women medical students are admitted annually.

The numerous appointments open to students are those of clinical assistant to the general and special departments; medical, surgical, obstetric, and pathological tutorships; resident casualty officers, house physicians, and house surgeons; resident anæsthetist; resident radiologist; bacteriologist; clinical pathologist; pathological, medical, surgical, and obstetrical registrarships. Sixteen resident medical and surgical officers are appointed half-yearly.

Scholarships and Registrarships (those in connexion with King's College have already been enumerated).—Scholarships of the total value of £1530 are awarded annually. These include: *(a)* Medical Entrance Scholarships—Science, £75; Anatomy and Physiology, £75; Pathology, £75; *(b)* two Burney Yeo Entrance Scholarships, £105 each, open to students of Oxford and Cambridge on the recommendation of the Regius Professors; *(c)* two Raymond Gooch Scholarships, £120 each, open to students of British Universities on certain conditions; *(d)* Epsom College Scholarship, value £100, offered annually to a student of Epsom College who has taken the first part of the courses for Medical Degrees at the Universities of Oxford, Cambridge, or London; *(e)* two Seaman Scholarships, each £50 a year for a period not exceeding five years, restricted to the sons of clergymen of the Church of England; *(f)* Senior Scholarship (Clinical Studies), £40. The holders of the Warneford and Sambrooke Scholarships awarded by King's College take the subjects of the preliminary and intermediate examinations at King's College, and the final subjects at King's College Hospital. Three Sambrooke Registrarships, open to matriculated students who have filled certain appointments in hospital.

Prizes.—Tanner Prize, £10, Obstetrics and Diseases of Women; Todd Prizes, first £8 and medal, second £4, for Clinical Medicine; Burridge Prize, £4 4s., Forensic Medicine; Jocelyn Almond Prize, £5 5s., Diseases of Children; Wallis Prize, £10, Dentistry; The Ferrier Prize in Neurology, Bronze Medal and £20; The Legg Prizes in Surgery and Surgical Pathology, Ware Prize for General Pathology, Cheyne Prize for Surgery. Thirteen Class Prizes, £3 each.

Post-graduate Courses.—Two advanced medicine courses are held annually, and are suitable for preparation for M.D. and M.R.C.P. Examinations.

Clubs, Hostel, Athletic Ground.—The King's College Hospital Clubs and Societies Union consists of the Listerian and Musical Societies, the Students' Common Rooms, and the various athletic and sports clubs. Two new squash rackets courts were opened in January, 1933. The athletic ground, over six acres in extent, is on Dog Kennel Hill, about ten minutes' walk from the hospital. There are also tennis courts in the grounds of the hospital and of "The Platanes"—a hall of residence for students of the College and the hospital.

London Hospital

The hospital, with its Medical College and Dental School, is situated in Mile End-road, and contains 843 beds. Its position in the neighbourhood of the extensive docks, factories, and workshops of the east of London is unrivalled, and it presents an immense field for clinical instruction. There are special departments for the treatment of diseases of children, the eye, ear, nose and throat, skin and teeth. In addition there are departments devoted to gynæcology and obstetrics, orthopædics, cardiology, brain surgery, radiology, electro- and physico-therapeutic light therapy, radium, and vaccine therapy. The special departments are attended by a large number of patients, and afford to the student the means of becoming experienced in every branch of practice. The recent additions have greatly increased the efficiency with which the clinical teaching can be given.

A Clinical Unit in medicine, under the charge of a whole-time director, provides for the more elaborate methods of diagnosis and treatment, and takes a leading part in the initiation and coördination of medical research. The director has an assistant director, two assistants, and two house physicians.

To each medical and surgical firm throughout the hospital there is attached a first assistant, who is responsible for instructing the clerks or dressers of the firm in elementary medicine and surgery, and who assists the honorary members of the firm in the preparation of their demonstrations. In the department of obstetrics and gynæcology there is a first assistant and two resident accoucheurs. In the department for children's diseases there is a first assistant, a house physician, and two clinical assistants. Special courses of lectures and demonstrations are arranged in medicine and surgery and their ancillary subjects. Opportunities for research are provided under the supervision of the staff.

Owing to the large number of patients more appointments are open to students before and after qualification than at any other hospital. Holders of resident appointments have free board. Special classes are held for the examinations of the University of London, for the Fellowship of the Royal College of Surgeons, for the Membership of the Royal College of Physicians, and for other higher examinations. Special entries for medical and surgical practice can be made.

The salaried appointments open to past students of the hospital are those of assistants to the medical unit; first assistants to the medical and surgical firms; assistants to the departments of obstetrics and gynæcology; clinical assistants in the medical, surgical, ophthalmic, aural, light and skin, orthopædic, and electrical departments, and in the institute of pathology and clinical laboratory. There are appointed annually 4 resident accoucheurs, 14 resident house physicians, and 23 resident house surgeons, 14 resident receiving-room officers, 8 resident emergency officers, 8 clinical assistants to the medical out-patient department, and 16 clinical assistants to the surgical out-patient department, also paid and unpaid clinical assistants in the various special departments.

Scholarships and Prizes.—Entrance Scholarships: Price Scholarship £100, and one Scholarship of £50, subjects of First Medical Examination at the University of London; Epsom College Scholarship, free education, subjects of First Medical Examination as above; Price Scholarship, open to students of Oxford and Cambridge Universities, £100, Human Anatomy and Physiology; two Open Scholarships, each of the value of £100, subjects, Human Morphology and Embryology, Physiology and Pharmacology, Biochemistry, Pathology, Bacteriology, and Morbid Anatomy. Prizes: Buxton Prize, £40, subject of Anatomy and Physiology; Prize in Clinical Obstetrics and Gynæcology, £20; Sutton Prize, £20, Pathology; Duckworth Nelson Prize, biennial, £10, Practical Medicine and Surgery; Letheby Prizes (2), £25, Chemistry and Chemical Pathology; four Dressers' Prizes, amounting to £20, zeal, efficiency, and knowledge of Elementary Clinical Surgery; Hutchinson Prize, triennial, £60, Clinical Surgery; Treves Prize, £20, Clinical Surgery; two Practical Anatomy Prizes, £6 and £4 respectively; Andrew Clark Prize, £14, Clinical Medicine and Pathology; T. A. M. Ross (Prox. Acc.) Prize, £10 10*s.*, Clinical Medicine and Pathology; James Anderson Prizes (4), £20, Elementary Clinical Medicine; Arnold Thompson Prize, £15, Diseases of Children; and Liddle Prize, triennial, £120.

Medical Research Funds.—Funds to the value of over £113,000 permit of financial assistance being given to students and graduates engaged in Medical Research.

A laboratory for the manufacture of certain preparations of Radium has recently been endowed.

A Residential Hostel is provided for students, and a hostel for resident medical officers. The Union Athletic Ground, 13 acres, is within easy reach of the hospital.

St. Mary's Hospital

The Hospital and Medical School have on one side a poor district of 500,000 persons, and on the other side the residential districts of Kensington and Bayswater. The hospital contains 370 beds, and recent structural additions have added two new operating theatres. By a scheme of affiliation, for teaching purposes, of certain neighbouring hospitals the teaching facilities extend over 1000 beds. The medical school provides complete courses of instruction. and students can join at once on passing a preliminary examination in arts. Terms begin in October, January, and April.

Clinical Units in medicine and surgery were established in 1920. Under this system professors of medicine and surgery, with competent assistants, give their whole time to teaching and research. This means a regularity of teaching and a degree of individual attention that are only possible where Units exist. The system also provides additional salaried posts which are open to students after qualification.

The Hospital has lying-in beds to which considerable additions have been made during 1933, and in addition to the instruction thus obtained each student attends a short course at Queen Charlotte's Hospital, as part of his training in Midwifery, without additional fee.

Students specially interested in Pathology and Bacteriology have singular advantages at St. Mary's. The institute comprises seven special departments, the whole being under the personal direction of Sir Almroth Wright. Certain Research Scholarships of £200 each are awarded annually to students working in the departments of the institute; and research beds have been instituted. Clerkships in pathology, bacteriology, and chemical pathology, lasting for a period of three months, are open to students of the fifth year, and enable them to carry out the pathological and bacteriological investigations of the wards, and learn the necessary technique under supervision. Seventy-two of these posts are available annually. Numerous appointments are open to newly qualified members of the medical school, including ten salaried posts with salaries varying from £200 to £750 per annum. A special postgraduate course is held during the first week-end in October, and is open to all general practitioners and other qualified men without fee.

Entrance Scholarships.—Two Entrance Scholarships of the value of £210 each are awarded annually, by nomination in July, the Geraldine Harmsworth Scholarship, £200, and one or more University Scholarships of £200 are awarded in July.

The athletic ground (10 acres) is situated at Wembley and can be reached in 20 minutes by a constant service of trains. The pavilion has recently been enlarged and improved.

During the past three years the medical school has been rebuilt on a site adjoining the Hospital, and the buildings are now in use. The Architect, Sir Edwin Cooper, A.R.A., has contrived to solve the difficulty of making a building, mainly devoted to laboratories, at once attractive and serving its purpose. It consists of five floors with a basement, and provides for the teaching of the preliminary and intermediate subjects of the medical curriculum, with ample space for research work. A library and speech hall occupies a prominent position upon the ground floor, and a students' restaurant opens on to a courtyard, where are a garage for 50 cars, and a swimming bath. A squash racquets court and gymnasium with a boxing-ring open out of the students' common room.

Middlesex Hospital

The hospital and cancer wing contain over 470 beds, with special wards for cancer, maternity, gynæcological, otological, neurological, dermatological, and ophthalmological cases, and for diseases of children. Other special departments include those for diseases of the eye, ear, nose and throat, and skin; nervous diseases, orthopædic cases, diseases of the rectum, and venereal diseases. There is also an electrotherapeutic department and a department of radium therapy and research. The cancer wing, containing 88 beds and special investigation laboratories, offers unrivalled opportunities for the study of cancer, both in its clinical and pathological aspects. In the electrotherapeutic department, students obtain instruction in the treatment of lupus and cancer by the X ray method of treatment.

The following appointments are made at intervals annually: eight house physicians, eight house surgeons, two obstetric and gynæcological house surgeons, two casualty medical officers, two casualty surgical officers, one senior resident anæsthetist, two junior resident anæsthetists, four resident officers to the special departments, and two dental house surgeons. Nine registrars are appointed annually. Non-resident qualified clinical assistants are appointed to assist in the various out-patient departments. Clinical clerks and surgical dressers are also appointed in every department.

The medical school, which includes the Bland-Sutton Institute of Pathology, the Courtauld Institute of Biochemistry, the Barnato-Joel Laboratories, and the Ferens Institute of Otology, is fully equipped for the theoretical and practical teaching of all the subjects of the medical curriculum, and the University diplomas in radiology. Ample laboratory and classroom accommodation is provided. The teaching staff includes 6 professors, 1 university reader, 31 recognised teachers, 10 demonstrators, 4 tutors. The Bland-Sutton Institute of Pathology and the Courtauld Institute of Biochemistry are completely equipped for routine hospital investigations, teaching, and research work, and contain large pathological, bacteriological, and clinical laboratories, also smaller laboratories for individual research work. A well-equipped anatomical and pathological museum and reference library offer every facility.

Other features of interest are: the course in medical radiology and electrology, under the direction of the "Joel" Professor of Physics and Dr. J. H. Douglas Webster. A primary F.R.C.S. course is held twice yearly.

Scholarships and Prizes.—Two Entrance Scholarships, value £100 each, and two University Scholarships, value £90 and £60, are awarded annually in September. The successful candidates are required to become general students of the school. A Freer Lucas Scholarship is awarded annually on the nomination of the Headmaster of Epsom College. There are also two Broderip Scholarships, value £60 and £40 respectively; the Lyell Gold Medal and Scholarship, value £55 5*s.*; the John Murray Medal and Scholarship, value £25 (awarded every third year); the Freeman Scholarship, value £30; the Hetley Clinical Prize, value £25; the Leopold Hudson Prize, value 11 guineas; and the Second Year's Exhibition, value 10 guineas. There are numerous class prizes.

The Students' Amalgamated Clubs include the following: Medical Society, Common Room Society, Musical Society, cricket, football, rowing, chess, lawn tennis, hockey, sailing, golf, and fencing. There are a restaurant and a gymnasium in the school buildings, and athletic grounds at N. Wembley. Squash racquets are also available.

St. Thomas's Hospital

This Hospital contains 644 beds. There are special departments for the treatment of women, children, diseases of the eye, ear, nose and throat, skin, teeth, and for orthopædics. Nervous and mental diseases are treated in special departments. An electrocardiograph has been installed for the investigation of diseases of the heart. The tuberculosis department forms a part of the Lambeth scheme for treatment of patients and for instruction. The venereal department has been established as part of the London County Council scheme. Departments for radiology, electrotherapy, phototherapy, massage and remedial physical exercises are also special features. A speech clinic has been inaugurated in connexion with the children's department. Exceptional facilities are offered in the hospital laboratories for the study of general pathology, clinical pathology, chemical pathology, and of treatment by serums and vaccines. Surgical operations take place in the main theatres every day. Clinical teaching in the wards, out-patients' and special departments is available every day of the week. Clinical lectures are delivered every Wednesday during the sessions. Clinical Units in medicine and surgery have been established.

All appointments in the hospital are open to students without extra fee. Clinical clerks and dressers for in- and out-patients are selected from students who have completed their third year's work. Every student acts as clerk in the post-mortem rôom and in one of the pathological laboratories, takes his turn on maternity duty under proper supervision in the maternity ward and district, thus obviating any necessity for seeking instruction elsewhere. Students are instructed in the administration of anæsthetics by the hospital anæsthetists.

The arrangements are made to meet the requirements of all the examining bodies. Special classes are held for the examinations at the University of London and for the First and Final Fellowship Examinations of the Royal College of Surgeons of England. Tutorial classes in all subjects precede the various examinations. The hospital is easily accessible from all parts.

A resident assistant physician and a resident assistant surgeon, salary £225 each per annum, and a resident anæsthetist, salary £200 per annum, are appointed annually. Three medical and four surgical registrars at a salary of £250 rising to £300 hold their appointments on a tenure renewable to a maximum of four years. A pathological registrar to the department of obstetrics and gynæcology (at an annual salary of £250), an ophthalmic registrar (at an annual salary of £200), and an orthopædic registrar (unpaid) are appointed yearly. Eight resident casualty officers and anæsthetists are appointed every six months. Seven house physicians (including two obstetric house physicians and one house physician to the department of diseases of children), nine house surgeons (including two ophthalmic house surgeons, one orthopædic house surgeon, and two house surgeons to the ear, nose and throat department) are appointed every six months. Clinical assistants in the special departments are appointed every three months, and hold office for six months if recommended for re-election. There are three assistants in the department of pathology; the senior receives £600 a year, and the two juniors £450 each.

Scholarships and Prizes.—At this school there are the following Entrance Scholarships—namely, one in Arts, equivalent to the tuition fees for the first two years of study; two in Natural Science, of the value of £150 and £60 respectively; and the University Scholarship of £100 in any two of the following: Anatomy, Physiology, Pathology, Chemistry, also the "Hector Mackenzie" University Exhibition of the value of £60. The value of all entrance scholarships must be taken out in tuition fees. The money value and subjects of examination of the remainder are as follows: (*a*) William Tite Scholarship for second-year students, £25; (*b*) and (*c*) Musgrove Scholarship or (alternately) Peacock Scholarship each for third-year students and tenable for two years, £35 each; (*d*) Mead Medal, Medicine, Pathology, and Hygiene; (*e*) Wainwright Prize, Medicine; (*f*) Toller Prize, Medicine; (*g*) Cheselden Medal, Surgery and Anatomy; (*h*) Clutton Memorial Medal in Clinical Surgery, biennial; (*i*) Beaney Scholarship, £50, biennially, Surgery and Surgical Pathology; (*j*) Solly Medal and Prize, biennial, Reports of Cases; (*k*) Sutton Sams Prize, biennial, Report of Cases; (*l*) Bristowe Medal, Pathology and Morbid Anatomy; (*m*) Hadden Prize, Pathology and Morbid Anatomy; (*n*) Grainger Testimonial Prize, £31 10*s*., Anatomy and Physiology; (*o*) Louis Jenner Research Scholarship, tenable for two years, £60 annually, Pathology.

St. Thomas's House, the Students' Club, comprises spacious dining-, smoking-, and reading-rooms, and accommodation for some 60 resident students. There is no occasion for students to leave the hospital premises during working hours.

University College Hospital

The final subjects in the curriculum are taught at the medical school of the hospital, which has 540 beds, including 85 in the new obstetric hospital. Clinical Units in medicine, surgery, and obstetrics and gynæcology are now in operation. The whole-time directors of the Units are concerned with the organisation of the teaching generally, but the honorary staff are responsible for the largest share of the teaching in the wards and out-patient department of the hospital. The department of otology, rhinology, and laryngology (the Royal Ear Hospital) has been provided with a separate building in Huntley-street, adjacent to the obstetric hospital. It contains 41 beds, including eight private wards for patients of limited means. In the dental school in Great Portland-street there is afforded the opportunity for attending lectures and practical instruction in diseases of the mouth and teeth.

The hospital is equipped with all modern appliances for investigation. The new buildings of the obstetric hospital of 85 beds (rendered possible by the Rockefeller Benefaction), the new residents' house (with accommodation for 30 residents and students), the extension to the nurses' home, and new research laboratories for the medical school are now finished and in full occupation. Twelve women students are admitted annually.

Original research in all subjects can be pursued in the laboratories of the school under the professor of pathology, and students can receive grants under certain conditions from the Charles Graham Medical Research Fund.

Clerkships and dresserships to the physicians, surgeons, anæsthetist, and pathologist are allotted amongst the students of the hospital. Maternity students are appointed each month and reside in the Students' House connected with the medical school and hospital. Sixteen house physicians, ten house surgeons, ten obstetric assistants, four house surgeons to the Royal Ear Hospital (of the total number of resident officers not more than three may be held by women students at any one time) are selected annually by examination from among the senior students who have a medical qualification. All house officers reside free in the hospital. In addition to these posts there are certain special appointments which are vacant from time to time and are filled by senior students of the hospital: resident medical officer, surgical registrar, medical registrar, obstetric registrar, Harker-Smith cancer registrar, ophthalmic registrar, registrar to the Royal Ear Hospital, radiological registrar, casualty medical officer and a casualty surgical officer, first assistant in the children's department; assistants in ear, nose and throat, ophthalmic, skin, and venereal diseases departments and in the department of psychological medicine, and house anæsthetist.

Assistants to Medical, Surgical, and Obstetric Units. These salaried appointments are for senior students who may desire to remain at Hospital after holding the ordinary resident appointments continuing clinical work or pursuing laboratory or other research. The salaries range from £250 up to £900 a year, resident quarters being provided only for the chief assistant to the Obstetric Unit. The total number of such assistantships varies from time to time, being generally about 12, and an aggregate sum of about £5000 annually is available for their salaries.

Scholarships and Prizes (those in connexion with University College have already been enumerated).—At this School the first two Scholarships (*a*) and (*b*) entitle the holder to a complete course at University College and University College Hospital Medical School; the second two (*c*) and (*d*) entitle to a final course at the Medical School. The money value and subjects of examination are as follows: (*a*) Entrance Scholarship, Bucknill, 135 guineas, Chemistry, Physics, Botany, and Zoology; (*b*) Epsom Free Medical Scholarship, subjects of Preliminary Scientific Examination and Nomination by Epsom College; (*c*) and (*d*) two Goldsmid Entrance Scholarships entitling the holder to the Final Course of Medical Study, two of the following subjects: Anatomy, Physiology, General Pathology, Biochemistry; (*e*) Goldsmid Entrance Exhibition, entitling the holder to a reduction by £80 in the fees due for the full course of Final Medical Studies, two of the following subjects: Anatomy, Physiology, General Pathology, Biochemistry; (*f*) Filliter Entrance Scholarship, entitling the holder to a reduction by £52 10*s*. in the fees due for the full course of Final Medical Studies. Students need take Pathology alone if they desire to enter for the Filliter Entrance Scholarship only; (*g*) Ferriere Scholarship, value £25; (*h*) Graham Scholarship in Pathology, £300 per annum for two years, awarded by the Senate of the University of London; (*i*) Atkinson Morley Scholarship, tenable for three years, £45 per annum, Surgery; (*j*) Atchison Scholarship, tenable for two years, £55 per annum, General Proficiency in Medical Studies; (*k*) Magrath Clinical Scholarship, about £150, Clinical Cases; (*l*) Percival Alleyn Scholarship, about £75, Surgery; (*m*) Filliter Exhibition, £30, Pathology; (*n*) Erichsen Prize, £21 1*s*., Practical Surgery; (*o*) two Senior and two Junior Fellowes Clinical Medals for Clinical Medicine; (*p*) two Liston Gold Medals for Clinical Surgery; (*q*) Alexander Bruce Gold Medal for Pathology and Surgery; (*r*) Tuke Silver and Bronze Medals for Pathology; (*s*) Radcliffe Crocker Travelling Scholarship for Dermatology; and (*t*) Leslie Pearce Gould Travelling Scholarship for Surgery. A limited number of Bursaries are available from the Atchison Fund, awarded at the discretion of the Dean, to enable students whose means do not allow to take Resident Posts.

The Museum of Pathological Anatomy is open for study daily. The Anatomical Museum of the University of London, University College, is open to all students of University College Hospital and medical school on the recommendation of the school committee. The library, open daily to every student of the School, contains about 30,000 medical works, including all the current text-books and works of reference.

The Medical Society exists for the dual purpose (1) of promoting the study of medical and surgical science, and (2) of promoting social intercourse among its members. All male students of the medical school are required to become members, and meetings are held once a fortnight for appropriate discussion connected with the study of medicine. The Society includes various athletic clubs and superintends the gymnasium and squash racquet courts in the medical school, and the athletic ground at Perivale.

In Gower-street there is a well-equipped residential hostel solely for the use of the medical students.

Westminster Hospital

The Hospital contains 241 beds, and has attached to it a Radium Clinic with 22 beds, elaborately equipped for all forms of radium therapy and research. There are separate departments for diseases of the eye, skin, teeth, ear, nose and throat, for orthopædic practice, for diseases of women, for diseases of children, for radiography, for venereal disease, and for massage, electrical and light treatment. The anatomical, pathological, and materia medica museums are open to all students of the school.

The entire teaching of the hospital is devoted to the subjects of the Final Examinations. Arrangements are made for the tuition required for Preliminary and Intermediate subjects.

Paid appointments as medical, surgical, and obstetric registrars, casualty officers, house physicians, house surgeons, and anæsthetist, are available for students when they have passed their examinations.

There are excellent opportunities for research work in the recently endowed John Burford Carlill Laboratories. Grants to assist research workers are made annually from the John Burford Carlill Endowment.

The annual fee includes membership of the Sports Union Club with its various branches—i.e., football, cricket, tennis, boxing, and Guthrie Society. The athletic grounds are situated in Tooting and are reached in 20 minutes from the hospital.

Scholarships and Prizes.—The following Entrance Scholarships are offered for competition: Winter Session: Two Scholarships in Anatomy and Physiology, £75 each. Summer Session: Two Scholarships in Anatomy and Physiology, £75 each. A certain number of Scholarships have been allotted to Universities of England, Wales, and the Colonies, and to Public Schools. These Scholarships are awarded entirely on the nomination of the principal of the university or school. During the period of study the following prizes may be competed for: Sturges Prize in Clinical Medicine, about £6, Reports on Cases; Chadwick Clinical Surgery Prize, £5, Reports on Cases; Chadwick Prize, £21 in books or instruments—Medicine and Surgery, including Pathology and Applied Anatomy and Physiology; Frederic Bird Medal and Prize, open to Fourth-year Students, £14 in medal and books or instruments—Midwifery, Diseases of Women, Medicine, Pathology, Forensic Medicine and Bacteriology, and Public Health and Toxicology; Abrahams Prize in Clinical Pathology, 5 guineas, a Paper and Tests in Practical Work; Hanbury Prize in Diseases of Children, 10 guineas; Alfred Hughes Memorial Prize, open to Second-year Students, about £5 in books or instruments—Anatomy; Huxley Memorial Prize, 3 guineas in books or cash, open to Second-year Students—Physiology; Carter Gold Medal and Prize for Botany, open to Students of not more than three years' attendance, gold medal and books of the joint value of £15; Jelf Medal awarded to Third-year Students; Second-year Scholarship £20, Elementary Anatomy, Physiology, Histology, and Organic Chemistry; Daniell Scholarship, £40, Chemistry; Rabbeth Scholarships open to First-year Students, one of £30 and one of £15; Class Examinations in the Preliminary Scientific Course. Inghley Prize in Pharmacology, £5, open to Students who within two years of passing the first examination for medical degrees have completed the course in Pharmacology. Hare Prize in Zoology, £2 10*s*., open to First-year Students.

London (Royal Free Hospital) School of Medicine for Women

The Royal Free Hospital contains 286 beds. The Hospital also has large casualty and out-patient departments. A new block has recently been completed to extend the special departments for orthopædic, light, and obstetric and gynæcological out-patients. Maternity districts are attached to the Obstetric Unit operating in the Gray's Inn-road and Essex-road areas. Students also attend the in-patient and out-patient practice of the Elizabeth Garrett Anderson Hospital, Cancer Hospital, Hospital for Sick Children, Great Ormond-street, National Hospital, Queen-square. South London Hospital, and Central London Ophthalmic Hospital. Students after qualification can hold posts at the Royal Free Hospital of house physicians, house surgeons, obstetric assistants, clinical assistants, assistant anæsthetist and pathologist, and medical, gynæcological, and surgical registrars; and the posts of demonstrators in all the departments at the Medical School.

A Clinical Unit in Obstetrics controls 68 beds. The Pathology Unit is being extended and spacious new quarters will be available for 1933–34.

Courses are arranged for the Primary Fellowship Examination of the College of Surgeons.

The School buildings have been entirely rebuilt in recent years, and there are spacious. well-equipped laboratories. which afford every facility for efficiency of teaching and practical work in all departments. Students' Chambers are provided in the neighbourhood of the school and the Warden can be consulted on the subject.

Scholarships and Prizes.—Among the larger of these awards are the following: (*a*) Isabel Thorne and A. M. Bird Scholarships of £30 a year for six years. (*b*) St. Dunstan's Medical Exhibition, £60 a year for three or five years. (*c*) Mrs. George M. Smith Scholarship, £50 a year for three or five years. (*d*) Bostock Scholarship, £90 a year for five years. (*e*) Mabel Sharman-Crawford Scholarship, £20 a year for four years. (*f*) Sir Owen Roberts Scholarship, £75 a year for four years. (*g*) Mabel Webb and A. M. Bird Research Scholarship. £200 for one year. (*h*) Fanny Butler Scholarship, £16 a year for four years. (*i*) Sarah Holborn Scholarship, £20 a year for three or five years. (*j*) Dr. Margaret Todd Scholarship, £37 10*s*. a year for four years. (*k*) Lieutenant Edmund Lewis and Lieutenant Alan Lewis Memorial Scholarship, £25 a year for four years. (*l*) Alfred Langton Scholarships, £35 a year for two years. (*m*) Flora Murray Bursary, awarded every year to a fifth-year student, £50. (*n*) A. M. Bird Clinical Scholarship, £30 a year for three years. (*o*) School Jubilee Bursary, tenable for three years, £50 a year. (*p*) John Byron Bursary. £20 for two years. (*q*) Helen Prideaux Prize and Julia Ann H. Cock Prize, to be spent in assisting the newly qualified holder to further study, £60 each. (*r*) A. M. Bird Post-graduate Scholarship in Pathology, £200 for one year. (*s*) Dr. Edith Pechey Phipson Post-graduate Scholarship of the value of £100, open to all medical women, preferably coming from India or going to work in India. The Dorothy Chick Gift, £20, and other prizes value £34 are awarded annually. The Students' Union arranges the social, athletic, and other clubs and societies.

Inquiries may be addressed to the Warden and Secretary of the Medical School, 8, Hunter-street, London, W.C.

UNIVERSITY OF DURHAM

The University of Durham grants degrees of Bachelor of Medicine, Bachelor of Surgery, Doctor of Medicine, Master of Surgery, Doctor of Surgery, Bachelor of Hygiene, Doctor of Hygiene, Bachelor of Dental Surgery and Master of Dental Surgery, a Diploma in Public Health, Diploma in Psychiatry, and a Licence in Dental Surgery.

For the degrees of *Bachelor of Medicine* and *Bachelor of Surgery* there are four professional examinations. The subjects of the First Examination are—Elementary Biology and Chemistry in relation to medicine. The subjects of the Second Examination are—Anatomy and Physiology. The subjects of the Third Examination are—Pathology and Bacteriology, Materia Medica, Pharmacology and Pharmacy, Medical Jurisprudence, and Public Health. The subjects of the Fourth Examination are—Medicine, including Therapeutics, Clinical Medicine, Surgery, Clinical Surgery, Operative Surgery, Midwifery and Gynæcology, Psychological Medicine, Diseases of the Skin, of the Throat, Nose, and Ear, and of Children, and Ophthalmology. The University requires that at least one year be spent in residence in the University; in exceptional cases candidates may comply with this regulation by attending at the College of Medicine for one year but all the professional examinations must be passed in the University.

For the degrees of *Doctor of Medicine* and *Master of Surgery* a candidate must not be less than 24 years of age. He must also have obtained the bachelor degrees, and been engaged for at least two years subsequently to the date of admission to these degrees in research work, or in attendance on the practice of a recognised hospital, or in the naval or military services, or in medical or surgical practice. The candidate for the M.D. degree may present an essay or undergo a special examination in the subjects of Medical Anatomy, Medical Pathology, and the Principles and Practice of Medicine. The subjects of examination for the M.S. are—Principles and Practice of Surgery, Surgical Pathology, Surgical Anatomy, Surgical Operations, Clinical Surgery.

Doctor of Surgery.—Candidates must be registered medical practitioners, and not less than 25 years of age, and must devote three years, subsequently to obtaining a registrable qualification, to the study of Surgery, one at least to be spent in the University. The course of study of the candidate must be submitted to the Professor of Surgery and approved by the Board of the Faculty. One year shall be devoted mainly to work in the departments of Anatomy, Physiology, Pathology, and Bacteriology, and the candidate must submit evidence of having so worked. Not less than six months of another year must be spent as resident surgeon in a recognised teaching hospital, and the rest of the year in the study of surgery in a recognised medical centre. Not less than six months of one of the three years must be spent in surgical study abroad.

Candidates must give six weeks' notice to the Secretary of Examinations, University of Durham College of Medicine. The M.D. (essay) must be sent in before April 1st.

Scholarships and Prizes.—The following are awarded: University of Durham Entrance Scholarship. £25 a year for four years; Pears' Entrance Scholarship, £40 a year for three years (awarded every third year); Heath Entrance Scholarship (from Kepier Grammar School), £60 (renewable); Province of Durham Masonic (Entrance) Scholarship, £60 (renewable); Heath Scholarship for Surgery, £200, available every second year; Rutherford Morison Surgical Scholarship, £180, available every third year. Approved applicants may obtain special grants for surgical research from the Stephen Scott Research Fund.

The following Scholarships are tenable for one year, namely: Tulloch Scholarship for Elementary Biology and Organic Chemistry, £20; Dickinson Scholarship for Medicine, Surgery, Midwifery, and Pathology, £20; Charlton Scholarship for Medicine, £25; Gibb Scholarship for Pathology, £28; Luke Armstrong Scholarship for Comparative Pathology, £25; Stephen Scott Scholarships for Anatomy and Physiology, two of £50 each; Philipson Scholarships for highest marks in Final M.B., B.S. Examinations, two of £45 each; Goyder Memorial Scholarship for Clinical Medicine and Clinical Surgery, interest on £325; Hamilton Drummond Memorial Scholarship, in aid of research in Clinical Surgery, about £50; Gibson Prize for Midwifery and Diseases of Women and Children, £10; Turnbull Prize and Silver Medal for Surface Anatomy; and Outterson Wood Prize for Psychological Medicine, £10; Sewell Memorial Prize and Silver Medal for Clinical Pathology.

For further information apply to the Dean of the College.

Newcastle-upon-Tyne: College of Medicine

Hospital practice and post-graduate work are carried out at the Royal Victoria Infirmary, a general hospital containing more than 600 beds, and there are facilities for the study of the various special subjects. Post-graduate work can be pursued at the Newcastle General Hospital.

Practical midwifery can be studied at the Princess Mary Maternity Hospital, which contains 90 beds, with an annual indoor and outdoor attendance on 3000 cases.

Psychological medicine can be studied at the Newcastle Mental Hospital, and infectious diseases at the City Hospital, under the M.O.H. of the city.

The bacteriological laboratory is adjacent to Armstrong College.

Post-graduate Instruction.—1. General courses in Clinical Medicine, Surgery, and Pathology at the Royal Victoria Infirmary, meeting once weekly for ten weeks. One course is held from October to December and one from April to June. 2. Special courses of clinical instruction, meeting once weekly for ten weeks, in the following subjects: Gynæcology; Diseases of the Eye; Diseases of the Throat, Nose, and Ear; Diseases of the Skin; Venereal Diseases; Neurology; Diseases of Children; Electrotherapeutics and Radiology; special courses in Midwifery are held at the Princess Mary Maternity Hospital. 3. An intensive course of 14 days' duration in the Summer Vacation. 4. In addition to the regular post-graduate courses practitioners may attend the ordinary medical and surgical practice of the Royal Victoria Infirmary, also at the Princess Mary Maternity Hospital for specified periods, and for clinical instruction in medicine and surgery at Newcastle General Hospital.

There is a well furnished Students' Union for the students of the Newcastle Division of the University, and special accommodation has been provided for women students.

Royal Victoria Infirmary

The Infirmary has over 600 beds. Clinical lectures are delivered by the physicians and surgeons weekly and ward demonstrations are given daily. Tutorial classes are given by the assistant physicians, assistant surgeons, the medical and surgical registrars, and the assistant to the gynæcological department, and demonstrations are given in the several out-patient departments daily. Pathological demonstrations are given by the pathologist daily or as opportunity occurs. In addition to medical and surgical in-patient and out-patient departments the following special departments are fully equipped for teaching students: ophthalmic, throat, nose, and ear, skin, and venereal disease, gynæcological, orthopædic, and electrical. The hospital building contains the following laboratories: 1. Special pathological laboratories attached to the post-mortem rooms. 2. Bacteriological laboratory in which all clinical bacteriological investigations are carried out. 3. There is in addition a clinical laboratory attached to each ward and to the out-patient department. There are five operating theatres in use in the hospital. The winter session of 1933 opens on Oct. 3rd, and the summer session of 1934 on April 17th. Applications for detailed information should be made to the Sub-Dean, Dr. Horsley Drummond, at the hospital.

Appointments of assistants in the pathological and other special departments and of clinical clerks and dressers are made periodically. Resident appointments are also made every six months; and each year medical and surgical registrars (who also act as tutors) are appointed from candidates who have previously held resident appointments at any recognised hospital. These latter posts afford an excellent opportunity for post-graduate study, not only at the Infirmary, but also in the departments of anatomy, physiology, pathology, and bacteriology of the college.

UNIVERSITY OF BIRMINGHAM

The University of Birmingham grants the degrees of M.B., Ch.B., M.D., Ch.M., and Ph.D. (for Research Study), and also a degree and a diploma in Public Health. The Senate may recognise attendance at other Universities as qualifying for these degrees and these examinations passed at Universities as exempting from the examinations in Physics, Chemistry, Biology, and Organic Chemistry; but at least three years must be spent in attendance upon classes in the University. The final year may be spent at any other medical school recognised by the University.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—The student must have passed the Matriculation Examination of the Joint Board or an examination accepted in lieu thereof. Before commencing the study of Anatomy and Physiology, examinations in Chemistry and Physics and Biology must be passed (First M.B., Ch.B.), or examinations in lieu thereof. All communications respecting the Matriculation Examination, and examinations accepted in lieu thereof, must be sent to the Secretary, Joint Matriculation Board, 315, Oxford-road, Manchester. Second Examination.—Part I., Organic Chemistry; Part II., Anatomy and Physiology. Third Examination.—General Pathology and Bacteriology. Fourth Examination (at the end of the fifth year).—Forensic Medicine and Toxicology; Public Health; and Materia Medica, Pharmacology, and Therapeutics. Two years' hospital work must have been accomplished. Final Examination.—Medicine, Surgery, Midwifery and Diseases of Women, Mental Diseases, and Ophthalmology. Attendance at a general hospital for a year after the passing of the fourth examination will be required, also attendance at a fever hospital three months, maternity hospital three months, and mental hospital three months. Vaccination instruction must be taken and courses of Ophthalmology, Venereal and Skin Diseases, and Diseases of Ear, Nose, and Throat, Medical and Surgical Anatomy, and Operative Surgery. Distinctions may be awarded in the subjects (severally) of the Second, Third, Fourth, and Final; and First- and Second-Class Honours in the Final Examination.

Degrees of Doctor of Medicine and Master of Surgery. One year after having passed the final M.B., Ch.B. examination the candidate can present himself for these higher degrees. They present a thesis on some medical or surgical subject, and pass a general examination in Principles and Practice of Medicine for the M.D. and one in Principles and Practice of Surgery, including operations on the cadaver, for the Ch.M., or, at the discretion of the examiners, in a special branch of Medicine or Surgery respectively. A thesis of exceptional merit may exempt from any part of these examinations, in which Honours may be awarded.

Degree of Ph.D.—Candidates must possess a medical degree of a British, Colonial, or other university approved of by the Senate of the University, and have been engaged as a rule in advanced study for two years, either in a laboratory of the University or in one or more of the hospitals associated with the University. But under approved conditions after the first year research may be carried on elsewhere, when, on completing the course, candidates present a thesis and submit themselves for oral and possibly written examination.

Scholarships and Prizes.—The following are awarded:—Entrance Scholarships: (*a*) Frank Fletcher and Catherine Fletcher Scholarships of £100 per annum each, for five years. Two or more offered annually; open to men and women students under certain prescribed conditions as to residence, &c.; (*b*) Sydenham Scholarship of £42, tenable for three years, award of Council to orphan sons of medical practitioners; (*c*) Sands Cox Scholarship of £21 per annum during two years, awarded to the candidate, not being more than 19 years of age, taking the highest marks at the Higher School Certificate Examination of the Joint Matriculation Board; (*d*) Dental Scholarship of £46 17*s*. 6*d*., Open Competitive Examination in subjects learned during apprenticeship; (*e*) Myers Travelling Studentship of £300, tenable for one year, offered in alternate years, awarded by vote of committee to M.B., Ch.B. candidates, tenable at some University or Hospital not in Great Britain or Ireland; (*f*) two Ingleby Scholarships of £10 each, awarded to the candidates at Final Examination obtaining highest marks in the subjects of Midwifery and Diseases of Women; (*g*), (*h*), (*i*), and (*j*) Four Queen's Scholarships of £10 10*s*. each, awarded to the candidate taking the first place in the Second, Third, Fourth, and Final Examinations respectively, provided that the candidate's work is sufficiently distinguished; (*k*) Priestley Smith Prize in Ophthalmology, value about £6 10*s*., is awarded annually to the student passing the Final M.B., Ch.B. Examination on first entry who shows the best knowledge of Ophthalmology, provided the Examiners deem him worthy of this distinction; (*l*) George Henry Marshall Scholarship of £10, awarded annually, for the encouragement of Research Work in Ophthalmology; and (*m*) Russell Memorial Prize, a prize of books, value about £2, awarded annually to the Student who, not being of more than six years' standing as a student of the School of Medicine of the University, shall pass the best examination in the subject of Nervous Diseases. The "Arthur Foxwell Memorial Medal" (Gold Medal) is awarded annually to the candidate taking the highest place in Clinical Medicine and passing the Final M.B., Ch.B. Examination in June; the "Sampson Gamgee Memorial Medal" (Gold Medal for Surgery) is awarded annually to the best candidates passing Final M.B., Ch.B. Examination in June in Surgery (paper, oral, and clinical); Peter Thompson Prize for Anatomy (Third Year); and John Barritt Melson Gold Medal for Physiology (Third Year). The University Clinical Board awards Gold and Silver Medals on examinations in Medicine, Surgery, and Midwifery, respectively, in fourth and fifth years, open to all students.

Clinical Instruction.—The medical students of the University receive their clinical instruction by attending the amalgamated practice of the General Hospital, Queen's Hospital, Maternity Hospital, Children's Hospital, Birmingham and Midland Eye Hospital, Mental Hospital, and Fevers Hospital, under the direction of the University Clinical Board. Appointments are open to students varying from £40 to £200 a year.

Post-graduate Instruction.—A "William Withering Lectureship" has been established. A course (or courses) of lectures is given annually for post-graduates on subjects chosen from year to year. In 1934 the lectures will be given by Dame Anne Louise McIlroy, D.B.E., M.D., B.Sc. (London School of Medicine for Women). The Ingleby Lectures on some subject in connexion with Diseases of Women and Children are given annually by specially appointed lecturers. Post-graduate Courses of Clinical Demonstrations for General Practitioners are arranged annually by the University Clinical Board (April to July) at the Birmingham General, Queen's, and Children's Hospitals.

Queen's Hospital

For the University clinical teaching conducted here there is a wealth of excellent material in the 330 beds. Ward rounds and out-patient clinic classes are held daily, and there are regular tutorial classes throughout the session. Post-graduate courses arranged by the University are conducted every year. There are special departments in gynæcology, diseases of the eye, of the ear, nose and throat, dentistry, radiology, pathology, bacteriology, biochemistry, physiotherapy, electrocardiography, and there is a psychiatric clinic associated officially with the Birmingham Mental Hospitals. There are also large Wards for Midwifery and Postnatal cases, a Nursery for instruction in Infant Welfare, an extensive Midwifery District, and residential facilities for students. There are 23 Resident Appointments (exclusive of Registrars) available each year for recently qualified students.

Birmingham General Hospital

There are 487 beds. Special wards for children, gynæcological, ear and throat, venereal, maternity, and radium cases; special beds for eye and skin cases. Laboratories for bacteriology, biochemistry, cancer research, and morbid histology. Separate rooms adjoin the medical and surgical wards for clinical pathology. Six operating theatres (one for out-patients and one for casualty department, which is a separate department), all designed and fitted on modern lines. In addition to clinical teaching given in the wards and out-patient department by the honorary staff, medical and surgical tutorial classes are held for senior and junior students. Clinical instruction in all the special departments, which include those for radium, electrotherapy, electrocardiographic investigation, and venereal diseases. Post-graduate classes are held in every branch of medicine and surgery. The Jaffray Branch Hospital contains 61 beds.

UNIVERSITY OF LIVERPOOL

The degrees in the Faculty of Medicine are Bachelor of Medicine and Bachelor of Surgery (M.B. and Ch.B.), Doctor of Medicine (M.D.), Doctor in Philosophy (Ph.D.), Master of Surgery (Ch.M.), Master of Hygiene (M.H.), and Master of Orthopædic Surgery (M.Ch.Orth.).

Degrees of Bachelor of Medicine and Bachelor of Surgery.—Candidates for the degrees of Bachelor of Medicine and of Surgery must have attained the age of 22 years on the day of graduation. At least two of the six years of medical study must have been passed in the University, and one year at least must have been passed in the University subsequently to the date of passing the First Examination. The other three years may be passed at any college or medical school recognised for this purpose by the University. Candidates must pass three examinations entitled respectively: the First Examination, the Second Examination, and the Final Examination. The subjects of the First Examination are: (1) Chemistry; (2) Biology (Zoology and Botany); (3) Physics. The subjects of the Second Examination are: (1) Anatomy; (2) Physiology (including Biochemistry and Histology). The subjects for the Final Examination are: (1) (*a*) Pathology, (*b*) Pharmacology and General Therapeutics; (2) (*a*) Forensic Medicine and Toxicology, (*b*) Public Health; (3) (*a*) Obstetrics and Diseases of Women, (*b*) Surgery, Systematic, Clinical, Operative, and Practical, including Ophthalmology, (*c*) Medicine, Systematic and Clinical, including Therapeutics, Mental Diseases, and Diseases of Children. Candidates may take Parts (1), (2), and (3) separately, provided that they do not present themselves for Part (3) until they have completed the sixth year of medical study.

Degrees of Doctor of Medicine and Master of Surgery. No candidate will be admitted to the degree of Doctor of Medicine or Master of Surgery unless he has previously received the Degrees of Bachelor of Medicine and Bachelor of Surgery, and at least two years have elapsed since he passed the examinations for those degrees. Candidates may also take the degree of Doctor of Medicine by examination after five years from taking Liverpool M.B., Ch.B. Candidates for the degree of Doctor of Medicine, who elect to present a thesis, are required (*a*) to present a thesis, acceptable to the Faculty, and certified to be the candidate's own work, together with (if the candidate desires) copies of published original papers upon Medical Science; (*b*) to present themselves for an oral examination on the subject of the thesis.

The subjects of examination for the Degree of

Master of Surgery are: Surgery, Clinical Surgery, Operative Surgery, Surgical Pathology and Bacteriology, and Surgical Anatomy.

The University also awards a *Diploma in Medical Radiology and Electrology*—Part I., Physics; Part II., Radiology and Electrology. The parts may be taken at one examination or separately.

Scholarships, Fellowships, and Prizes.—The following are awarded: (*a*) Robert Gee Entrance Scholarship (Men), annually, of £42 10s., tenable for four years; (*b*) Junior Lyon Jones Scholarship, of £19 per annum, tenable for two years, Competitive Examination among Junior Students in First M.B. Subjects; (*c*) Senior Lyon Jones Scholarship, of £19, Competitive Examination on results of Professional Examination in Anatomy and Physiology; (*d*) Derby Exhibition of £15, Competitive Examination in Clinical Surgery; and (*e*) Clinical School Exhibition of £15 in Clinical Medicine; (*f*) University Scholarship of £50 for one year, awarded on results of the Final (Part I.) Examination for the degrees; (*g*) Holt Fellowships, Physiology and Pathology, of £150 each, for one year; (*h*) Gee Fellowship, Anatomy, of £100, for one year; (*i*) John Rankin Fellowships in Anatomy, two, each of the value of £120, tenable for two years; (*j*) Johnston Colonial Fellowship, Biochemistry, of £100, for one year; (*k*) John W. Garrett International Fellowship, Bacteriology, of £100, for one year; (*l*) Thelwall Thomas Fellowship, Surgical Pathology, of £150, for one year; (*m*) Ethel Boyce Fellowship in Gynæcology, of £100, for one year; (*n*) Mary Birrell Davies Memorial Fund Scholarship, of the value of £60, tenable for four years, offered for competition in alternate years; open only to women students who will have attained the age of 19 on the first day of October in the year of the award; (*o*) Rankin Exhibition in Practical Anatomy, of £23, for one year; (*p*) Lady Jones Research Fellowship in Orthopædic Surgery, £200; (*q*) Samuels Memorial Scholarships, three at £27; (*r*) Ridgway Research Scholarship (£94); numerous prizes and medals.

The Medical School.—All the laboratories and classrooms are situated close together, communicating with one another, and are made up of four large blocks of buildings which form one side of the College quadrangle. There are the Johnston Laboratories for Biochemistry; the Medical School for Anatomy, Surgery, Toxicology, and Ophthalmology; and the Thompson-Yates Laboratories for Physiology and Pathology. There is also a separate building for Tropical Medicine. Medical research has also been endowed with several new laboratories in which students can pursue research work after graduation.

Clinical Studies.—The Clinical School of the University consists of four general hospitals—the Royal Infirmary, the David Lewis Northern Hospital, the Royal Southern Hospital, and the Stanley Hospital; and of five special hospitals—the Eye and Ear Infirmary, the Women's Hospital, Liverpool, Liverpool Maternity Hospital, the Royal Liverpool Children's Hospital, and St. Paul's Eye Hospital. These hospitals contain in all a total of about 1500 beds. The organisation of these hospitals to form one teaching institution provides the medical student and the medical practitioner with a field for clinical education and study which is unrivalled in extent in the United Kingdom. All the hospitals are within easy access of the University. There are a large number of appointments to house physicianships and surgeonships both at the general and special hospitals which are open to qualified students of the school.

Public Health Department.—This is located in a separate building, in which full courses of instruction are given to students for the Diplomas and Degrees of the University and of other Examining Boards.

Prospectuses and further information may be had on application to the Dean of the Faculty of Medicine, University of Liverpool.

UNIVERSITY OF MANCHESTER

Four degrees in Medicine and Surgery are conferred by the Victoria University of Manchester—viz., Bachelor of Medicine and Bachelor of Surgery (M.B. and Ch.B.), Doctor of Medicine (M.D.), and Master of Surgery (Ch.M.). A Diploma in Psychological Medicine, a Diploma in Public Health, a Diploma in Bacteriology, and a Diploma in Pathology are awarded by examination to registered medical practitioners.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—Before admission to the degrees of M.B. and Ch.B. candidates are required to present certificates that they will have attained the age of 21 years on the day of graduation, and that they have pursued the courses of study required by the University Regulations during a period of not less than five and a half years subsequently to the date of their registration by the General Medical Council, two of such years having been passed in the University subsequently to the date of passing the first M.B. Examination.

The First Examination: (1) Chemistry and Physics; (2) (*a*) Botany, (*b*) Zoology. Candidates must have attended the prescribed courses both of lectures and of laboratory work in each of the above-named subjects. The Examination is divided into two parts: Part 1, Inorganic and Elementary Organic Chemistry and Physics; Part 2, (*a*) Botany, (*b*) Zoology. The candidates sit for these parts separately. The Second Examination: (1) Anatomy and Histology; (2) Physiology, including Physiological Chemistry. Both parts must be passed simultaneously. The Third Examination: (1) Pharmacology and Materia Medica; (2) Pathology and Bacteriology. The Final Examination: (1) Medicine, Systematic and Clinical (including Mental Diseases and Diseases of Children); (2) Surgery, Systematic, Clinical, and Practical; (3) Obstetrics and Gynæcology (including Clinical and Practical); (4) Forensic Medicine; (5) Hygiene and Preventive Medicine. The Final Examination is divided into two parts: Part I., Forensic Medicine, Hygiene and Preventive Medicine; Part II., Medicine, Surgery, Obstetrics and Gynæcology (Systematic, Clinical, and Oral). The two parts of the Final Examination must each be passed as a whole. Candidates for the Second Part must have completed the sixth year of medical study.

Degree of Doctor of Medicine.—Candidates are not eligible for the degree of Doctor of Medicine unless they have previously obtained the degrees of Bachelor of Medicine and Bachelor of Surgery of this University, and at least one year has elapsed since they passed the examination for those degrees. Candidates may elect either (1) to present an original dissertation; or (2) to undergo an examination. The dissertation must embody the results of personal observation, or original research, either in some department of medicine or of some science directly relative to medicine. The examination, which will be written and practical, is in the Principles and Practice of Medicine, in Pathology, and in some other subject to be selected by the candidate.

Degree of Master of Surgery.—Candidates are not eligible for the degree of Master of Surgery unless they have previously obtained the degrees of Bachelor of Medicine and Bachelor of Surgery of this University, and at least one year had elapsed since they passed the examination for those degrees. The degree is conferred in the following branches: Surgery (Branch I.), Gynæcology (Branch II.), Ophthalmology (Branch III.), Laryngology, Otology, and Rhinology (Branch IV.).

Degrees of B.Sc. and M.Sc.—The ordinary degree of B.Sc. in the Schools of Anatomy and Physiology may be obtained by students in Medicine who in their third year of study for the degree of M.B., Ch.B., complete the additional courses in these subjects prescribed for this degree. Candidates for the Honours degree of B.Sc. in Anatomy or Physiology, who are students in Medicine, are required to attend courses in advanced

Anatomy and Physiology for four terms after passing the Second Examination for the degrees of M.B., Ch.B. Graduates in science may proceed to the degree of M.Sc. by presentation of an approved thesis.

Diplomas: 1. The following are available for candidates holding a registrable qualification in medicine, surgery, and midwifery; examinations are in two parts in each diploma and are written, oral, and practical. Candidates may present themselves for Parts I. and II. separately or at the same time provided that no candidate be admitted to Part II. unless he has already passed in Part I. No candidate's name will be published until he has satisfied the examiners in both parts of the examination:—

(*a*) *Diploma in Psychological Medicine.*—Part-time course: extending over three University terms, two of which must be spent at the University. Six months' residence must be spent at a recognised Hospital for Mental Diseases.

(*b*) *Diploma in Public Health.*—The course extends over twelve calendar months at least: Part I. of the examination is held in June and October, and Part II. in March and October. Instruction for at least one of the parts must be taken out at the University.

2. *In Veterinary State Medicine.*—Length of course, three University terms. Candidates must be members of the Royal College of Veterinary Surgeons.

3. *In Bacteriology.*—For candidates who have graduated either in science or medicine, or obtained other approved qualification. Length of course, one academic year. A satisfactory thesis on an approved subject must be presented.

4. *In Pathology.*—For candidates who have obtained a registrable medical qualification or other qualification approved by the Senate. Length of course, one academic year. A satisfactory thesis on an approved subject must be presented.

Scholarships, Fellowships, and Prizes.—The following are offered in connexion with medical study at the Victoria University:—Scholarships: Dreschfeld Entrance (triennial), £20; John Russell Medical Entrance, £45; Sam Gamble Entrance for Women; Graduate Entrance (fees up to 160 guineas); two Dauntesey Medical Junior, £50 each; Dauntesey Medical Senior, £50; Professor Tom Jones Exhibition in Anatomy, £25; Dickenson Trust Scholarships in Anatomy and Pathology; Platt Physiological, £90; Graduate Research Scholarship, £70; Dickenson Trust Travelling Scholarships in Medicine and Surgery; Ashby Memorial in Diseases of Children (triennial), £100; Holt Post-Graduate Medical Scholarship for Women, £60; Elected Research Studentships. Fellowships: Leech Research, £70; Professor Tom Jones, Surgical, £105; Morrison Watson in Anatomy, £150; John Henry Agnew in Diseases of Children, £120; Delépine in Preventive Medicine (biennial), £300; Worswick (Causes and Treatment of Rheumatoid Arthritis), £300; Pilkington Fellowship in Cancer Research, £300; Zimmern Travelling Fellowship for Men, £175, also for Women; Knight Fellowship in Psychological Medicine; Honorary Research Fellowships. Prizes: Sidney Renshaw in Physiology—Junior £10, Senior £20; Wild Prize in Pharmacology, £10; Turner Medical, two prizes each of 10 guineas; Dumville Surgical, £15; John Henry Agnew in Diseases of Children, £30. There are many general entrance scholarships, in addition to those already mentioned, open for competition, the examinations for which are held in the month of May. Full particulars can be obtained from the Registrar.

The Medical School.—This school, largely extended in 1920, is provided with dissecting-rooms, X ray rooms, physiological laboratories, private laboratories, and work-rooms, besides lecture-rooms, museums, and general and departmental libraries. A special laboratory is equipped for experimental work on the central nervous system. In the pathological laboratories (now removed to special buildings close to the Royal Infirmary) ample provision is made for the teaching of pathology and bacteriology and for the prosecution of original research. The Helen Swindells Laboratory is specially equipped as part of a new department for investigation in cancer. Ample facilities for investigation are provided in Anatomy, Physiology, and Materia Medica; new Pharmacological Laboratories were recently added. In the public health department, which is lodged in a separate institute in York-place, near the Royal Infirmary, suitable laboratory accommodation is provided for the study of sanitary chemistry, physics, and practical bacteriology in the departments of chemistry and physics and in that of pathology.

Clinical Studies.—The clinical and practical departments of medical study are taught partly in the medical school of the University and partly in the Royal Infirmary and St. Mary's Hospitals for Women and Children, a fever hospital, mental hospitals, a convalescent home, and other special hospitals.

THE MANCHESTER ROYAL INFIRMARY, near the University, has accommodation for 640 beds (including 54 beds at the Central Branch). Associated with the Infirmary are: (1) the Convalescent Hospital at Cheadle, containing 132 beds; and (2) the Central Branch in the City, which has accommodation for 54 patients. The Associated Hospitals thus contain 772 beds and are under the same management. The medical side consists of four units, each unit having a testing-room for the scientific investigation of morbid products and a class-room. The surgical beds are arranged in five units, each unit having its own operation theatre, with anæsthetising, recovery, sterilising, testing, and apparatus rooms, and its own class-room attached. The gynæcological, aural, and out-patient departments each have their own operating theatre. Bacteriological investigations are carried out in a special clinical laboratory. A department for the study of heart disease, with an electric cardiograph and other instruments for research, diagnosis, and teaching purposes is attached to the medical wards. There is also a laboratory for clinical research. The X ray department has nine separate X ray outfits for different purposes, and one large room is put aside specially for X ray demonstrations and teaching purposes. A large massage school is also connected with this department. Women students are admitted on the same terms as men. Two Entrance Scholarships in Medicine of the value of £160 each are offered annually by the Council of the Manchester University and the Medical Board of the Manchester Royal Infirmary for proficiency in Arts and Science subjects respectively. All the usual appointments may be held by those who have attended the practice of the Infirmary.

The ROYAL MANCHESTER CHILDREN'S HOSPITAL at Pendlebury contains 190 beds and 30 in the Convalescent Home, Lytham St. Anne's. Clinical instruction is given by the medical staff at the Hospital and Dispensary, Gartside-street, Manchester. There is a massage and electrotherapeutic department, also an artificial sunlight department. Clinical assistants are appointed for periods of six months. There is an orthopædic department, out-patients for which are seen at Gartside-street, and a ward at Pendlebury is devoted to these cases needing operative treatment.

ANCOATS HOSPITAL, MANCHESTER, is a general hospital of 120 beds and a Convalescent branch which is situated at Great Warford, Alderley Edge, Cheshire, and has 35 beds.

The medical side consists of three units under the care of three honorary physicians with three out-patient clinics of consultative nature. A cardiographic department is under the care of one of the physicians. Much work is done in gastro-enterology, neurology, and diseases of the blood. The surgical units are four in number, each under the care of an honorary surgeon; the orthopædic department, which deals with all fractures and bone injuries, is very large. One surgical unit is devoted to abdominal surgery, and one is devoted to oto-rhino-laryngology, while a urological department is under the care of one of the honorary surgeons. All these units have a largely attended out-patient department. Clinical teaching is given both to under-graduate and post-graduate Students in all the out-patient clinics which are free to them, and in the wards, while special courses of post-graduate lectures are given as part of the Manchester University post-graduate scheme. A University course of orthopædic surgery is given to students in the Michaelmas term. Available for post-graduate work are clinical assistantships.

There are six resident appointments which are open to men and women graduates. There are also four registrar appointments, part-time: medical, surgical, orthopædic, and laryngological made annually.

Post-graduate Studies.—Clinical Assistantships are available at various hospitals and at the Radium Institute. Attendance may be for half a day or one day weekly, or more as arranged with the hospital.

UNIVERSITY OF LEEDS

Four degrees in Medicine and Surgery are conferred—viz.: Bachelor of Medicine and Bachelor of Surgery (M.B. and Ch.B.), Doctor of Medicine (M.D.), Master of Surgery (Ch.M.), also Degrees and Diplomas in Dental Surgery and Diplomas in Public Health and in Psychological Medicine. Courses and Degrees in the Faculty are open to men and women alike.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—Candidates for these degrees are required to present certificates showing that they will have attained the age of 21 years on the day of graduation, and have attended courses approved by the University extending over not less than five years, two of such years at least having been passed in the University, one of which must be subsequent to the date of passing the First Examination. Candidates must also satisfy the examiners in the several subjects of the following examinations, entitled respectively: the Matriculation Examination, or such other examination as may have been recognised by the Joint Matriculation Board in its stead; the First Examination; the Second Examination; and the Final Examination. The First Examination consists of: Part I., Physics and Inorganic Chemistry; Part II., Organic and Physical Chemistry; Part III., Botany; Part IV., Zoology. Candidates will be allowed to pass the parts separately. The Second Examination consists of: Part I., Materia Medica and Practical Pharmacy; Part II., Anatomy and Physiology. Candidates will be allowed to pass either part separately. The Final Examination consists of: Part I., Pharmacology, Pathology, and Bacteriology; Part II., Medicine, Surgery, Obstetrics and Gynæcology; Part III., Forensic Medicine, Public Health, and Therapeutics. Part I. may be taken at the end of the second clinical year, and Parts II. and III. may be taken at the end of the third clinical year, but not before the completion of the fifth year of medical study. If taken separately Part III. may not be passed before Part II.

Degree of Doctor of Medicine and Master of Surgery. Candidates are not eligible for the degree of Doctor of Medicine or Master of Surgery unless they have previously received the degrees of Bachelor of Medicine and Bachelor of Surgery of the University (or of Victoria prior to December, 1904) and at least two years' Hospital Practice or four years' other professional practice for the former, and one year has elapsed for the latter since they passed the examination for those degrees. Candidates for the degree of Doctor of Medicine may present a dissertation and, if the dissertation is considered to be of exceptional merit, will not be required to pass an examination. The first term commences on Oct. 1st. Prospectus can be obtained from the Academic Sub-Dean.

Post-graduate work.—Practitioners wishing to attend Infirmary practice during short periods, or post-graduate classes held by members of the clinical staff, may do so on application to the Clinical Sub-Dean, from whom particulars may be obtained.

Clinical Studies.—The clinical studies are pursued mainly at the LEEDS GENERAL INFIRMARY AND WOMEN'S HOSPITAL, which has accommodation for 630 in-patients, including 88 beds at branch hospitals in the country. Clinical teaching takes place daily in the wards, and Clinical lectures are given in Medicine and Surgery by the Physicians and Surgeons. There are Medical, Surgical, Ophthalmic, Aural, Electrotherapeutic, and Radiographic Departments, in each of which special instruction is imparted to students. Gynæcological and Children's Departments, together with Laryngeal, Venereal, and Skin Clinics, are in operation, and there is a special ward for cases of nutritional disorders of children. Several valuable prizes are given at the end of each session. Numerous appointments at the Infirmary are annually open to students after qualification. Further particulars concerning these, and the scholarships and prizes open to competition, may be obtained from the Dean of the Faculty of Medicine.

In addition to work in the General Infirmary, clinical instruction in obstetrics is given in the Leeds Maternity Hospital and in mental and infectious diseases in the Wakefield (W.R.) Mental Hospital and Leeds City Fever Hospital respectively.

UNIVERSITY OF SHEFFIELD

The Degrees in the Faculty of Medicine are Bachelor of Medicine and Bachelor of Surgery (M.B., Ch.B.), Doctor of Medicine (M.D.), and Master of Surgery (Ch.M.), Bachelor of Dental Surgery (B.D.S.), and Master of Dental Surgery (M.D.S.). There is also a Diploma of Licentiate in Dental Surgery. The courses and degrees in the Faculty of Medicine are open to men and women alike. Candidates must matriculate in the University or pass such other examination as may be recognised for this purpose by the University and sanctioned by the Joint Matriculation Board, and must pass also the further examination in Chemistry and Physics.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—A candidate must have attained the age of 22 years on the day of graduation, and have pursued the courses of study required by the University regulations during a period of not less than five and a half years subsequently to the date of his matriculation, three of such years at least having been passed in the Faculty of Medicine of the University one at least being subsequent to the passing of the Second Examination. The subjects of the First Examination are Chemistry, Physics, and Biology. Candidates must, in addition to matriculation, pass a preliminary examination in Physics and Chemistry before taking the First Examination, for which they must have attended courses of instruction (lectures and laboratory work) in Chemistry, Physics, and Biology for one year each. Students who before entry have attained a standard in Chemistry and Physics approved by the Faculty of Medicine have the opportunity of working for the degree of B.Sc. (with honours) in Physiology concurrently with their work for the degree of M.B., Ch.B. The Second Examination: Candidates must have attended courses of instruction in Physiology (first part) for one year, and in Anatomy for five terms. The Third Examination: Candidates must have attended courses of instruction in Pathology for five terms, in Pharmacology for four terms (and one term in Pharmacy), in Applied Anatomy for four terms, and in Physiology (second part) for six terms. The Final Examination: The subjects are, Part I., Forensic Medicine and Public Health. Candidates must have attended courses for one term in each subject; Part II., Medicine (including Mental Diseases, Diseases of Children, and Vaccination), Special Pathology (including Morbid Anatomy and Clinical Pathology), and Therapeutics; Part III., Surgery (including the administration of Anæsthetics, Diseases of the Ear, Nose and Throat, Ophthalmology, and Surgical Pathology), and Obstetrics and Gynæcology, including Antenatal and Postnatal practice and Infant Hygiene. Candidates for Parts II. and III. must have completed a minimum of five and a half years of approved study.

Degree of Doctor of Medicine.—Candidates for the degree of Doctor of Medicine must have passed the examination for the degrees of M.B., Ch.B. at least three years previously, must present a thesis embodying observations in some subject approved by the professor of medicine, and must pass an examination in the Principles and Practice of Medicine.

Degree of Master of Surgery.—Candidates must have taken the M.B., Ch.B. at least three years previously, and must since have held for not less than twelve months a surgical appointment in a public hospital. The subjects of examination are Systematic, Clinical, and Operative Surgery, Surgical Anatomy, Surgical Pathology and Bacteriology.

Scholarships and Prizes.—The following scholarships are offered: Four Town Trustees scholarships offered annually, each of the value of £50 per annum for three years. Medical: offered annually, covers cost of tuition for a degree course in the Faculty of Medicine. Six Edgar Allen, offered annually, each of the value of £100 per annum for three years. Post-graduate: Frederick Clifford scholarship, value £50 per annum, tenable for two years. Mechanics' Institute scholarship, value £50 for one year with free admission to those University courses taken by the holder in connexion with his work, renewable for a second year. Town Trustees fellowship, value £75 for one year. Medals and Prizes: Kaye scholarship; Thomas Woodcock Prize; Gold Medal in Clinical Medicine and Surgery; John Hall Gold Medal in Pathology; Holroyd Gold Medal in Anæsthetics; the Walter S. Kay Gold Medal in Mental Diseases; bronze medals. Particulars of all the above may be obtained from the Registrar.

The Medical School.—The Medical Department occupies the entire north wing of the University quadrangle. The various athletic and other students' societies are under the management of the Union Representative Council, elected annually. There are large and comfortable common rooms both for men and women students, and two Students' Unions, one for men and one for women. A refectory is open daily at the University where students may obtain meals and refreshments at moderate prices. The University journal *The Arrows*, edited by a committee of staff and students, is published each term. There are Halls of Residence for Students; full particulars may be obtained from the Wardens and the Registrar.

Clinical Studies.—The University is within easy reach of the various hospitals with which it is connected for clinical purposes.

The SHEFFIELD ROYAL INFIRMARY (500 beds) provides all the opportunities of a large general hospital with special departments for Skin and Ear. The SHEFFIELD ROYAL HOSPITAL (340 beds) has special out-patient departments for Diseases of the Throat, Ear, Skin, Orthopædics, and Mental Diseases. The two institutions are amalgamated for the purposes of clinical practice, medical, surgical, and special. There are special departments for the treatment of Diseases of the Eye, with wards assigned to them, at both hospitals, and excellent junior appointments. The JESSOP HOSPITAL FOR DISEASES OF WOMEN, with 146 beds, has also a Maternity department, with about 900 in-patients per annum and about 3000 out-patient cases attended. The CHILDREN'S HOSPITAL has 92 beds. Special courses on Fevers are held at the CITY FEVER HOSPITALS (988 beds) and on Mental Diseases at the SOUTH YORKSHIRE MENTAL HOSPITAL (1900 beds). Every facility is afforded in the various laboratories for the prosecution of advanced studies and research.

Post-graduate Courses.—Post-graduate courses of clinical instruction are held annually in the various hospitals connected with the School.

UNIVERSITY OF BRISTOL

In the Faculty of Medicine there are the following degrees: Bachelor of Medicine and Bachelor of Surgery (M.B. and Ch.B.), Doctor of Medicine (M.D.), Master of Surgery (Ch.M.), Bachelor of Dental Surgery (B.D.S.), and Master of Dental Surgery (M.D.S). There are also the following diplomas: Diploma in Public Health (D.P.H.), Diploma in Dental Surgery (L.D.S.). and Diploma in Veterinary State Medicine.

All candidates for degrees in Medicine, Surgery, and Dentistry are required to pass, at Matriculation standard, an examination called the School Certificate Examination, or to pass such examination as may be regarded as equivalent by the Senate. All courses, degrees, and diplomas are open to men and women.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—Candidates shall be not less than 21 years of age and shall have pursued the courses prescribed by University Regulations during not less than five years after passing the first examination in Chemistry and Physics and entering on the professional curriculum at the University, or an institution recognised as equivalent, of which three shall have been passed in the University, and two of these three subsequent to passing the second examination. All candidates for the degrees of M.B., Ch.B., are required to satisfy the examiners in the several subjects of three examinations. The First Examination: The subjects of examination are: Chemistry (Inorganic), Physics, and Biology, the courses pursued being those for the time being approved for the intermediate part of the B.Sc. curriculum. This part of the curriculum shall extend over one year. (Candidates who have passed the Higher School Certificate approved by the Board of Education in these subjects will not be required to sit for the first examination and will be regarded as having completed one year of study.) The Second Examination: The subjects of examination are: Organic Chemistry (Part I.) and Anatomy and Physiology (Part II.). The Final Examination: The subjects of examination are: Materia Medica and Pharmacy, Pharmacology and Therapeutics, General Pathology, Morbid Anatomy, and Bacteriology (Part I.); Special Pathology, Forensic Medicine and Toxicology. Public Health, Obstetrics (including Diseases of Women), Surgery (Systematic, Clinical, Practical, and Operative, including Ophthalmology and Oto-rhino-laryngology), Medicine (Systematic, Clinical, and Practical, including Mental Diseases) (Part II.). The subjects included in Part II. may be taken in two groups—viz., Group I., Surgery and Obstetrics; Group II., Medicine, Public Health, Special Pathology, Forensic Medicine, and Toxicology. Candidates may pass Parts I. and II. together, or separately, and the two groups of Part II. may be taken together or separately. Forensic Medicine and Toxicology may be taken with Part I., or with Group II. of Part II.

Degree of Doctor of Medicine.—Candidates shall be Bachelors of the University of not less than two years' standing as such and may elect either (1) to pass an examination in General Medicine, or (2) to pass an examination in State Medicine, or (3) to present a Dissertation. The candidate who elects to pass the examination in State Medicine must hold a Diploma in Public Health of some University or College, and the candidate who elects to present a Dissertation may be examined in the subject thereof.

Degree of Master of Surgery.—The degree may be taken in General Surgery or in Special Subjects. Candidates shall be Bachelors of not less than two years' standing as such. For General Surgery, they shall pass an examination in Surgical Anatomy, Pathology, and Bacteriology, and in Operative, Clinical, and General Surgery, and shall present a dissertation. For Special Subjects—i.e., Ophthalmology or Oto-rhino-laryngology or Gynæcology—they shall, in addition to having studied and practised for two years the subject concerned, have held an approved appointment in it for not less than six months; they shall pass a written, oral, and clinical examination in the branch of Surgery concerned, as well as in the Anatomy, Physiology, and Pathology of the region of the body concerned (including in the case of Ophthalmology Physiological optics) and also a written examination in the principles of General Surgery.

Clinical Studies.—The allied hospitals (BRISTOL ROYAL INFIRMARY and BRISTOL GENERAL HOSPITAL) have between them about 660 beds and extensive out-patient departments, special clinics for Diseases of Women and Children, including antenatal and postnatal work, also for eye, ear, nose and throat, and skin diseases, in addition to large and well-equipped departments for Dental work and large outdoor Maternity Departments. The Bristol Royal Infirmary has now been selected by the National Radium Commission as a Radium Centre.

At each of these institutions there are well-arranged pathological museums, post-mortem rooms, and laboratories for morbid anatomy. There are also laboratories for work in clinical pathology, bacteriology, and biochemistry, in which special instruction is given in these subjects. Departments are provided and well-equipped for radiology, radiotherapy, actinotherapy, electrotherapy, and massage, with all forms of physiotherapy.

The students of the school also attend the practice of the Royal Hospital for Sick Children and Women, containing 120 beds, and that of the Bristol Eye Hospital with 40 beds, the Bristol Mental Hospital, Southmead Hospital, and Ham Green Fever Hospital. Other institutions, including Stoke Park Colony for mental defectives and the Winford Orthopædic Hospital, are also available for their special purposes.

There are numerous salaried junior appointments for residents who are graduates.

Scholarships and Prizes.—The following are awarded: The Ashworth Hallett Scholarship, value £40, open to women only; two Martyn Memorial Pathological Scholarships of £10 each; the Tibbits Memorial Prize, value 7 guineas, for proficiency in practical surgery; the Committee's Gold and Silver Medals for fifth or sixth year students for general proficiency; the Augustin Prichard Prize, value about 6 guineas, for proficiency in anatomy; the Henry Clark Prize, value 11 guineas, for proficiency in gynæcology; the Crosby Leonard Prize, value 6 guineas, for proficiency in surgery; the Suple Surgical Prize, a gold medal and 7 guineas; the Suple Medical Prize, a gold medal and 7 guineas; the Henry Marshall Prize, value £12, for dressers; the H. M. Clarke Scholarship, value £15, for proficiency in surgery; the Sanders Scholarship, value £22 10s., for general proficiency; the Barrett-Roué Scholarship for proficiency in diseases of the eye, ear, nose, and throat, value £17; Lady Haberfield Scholarship, value about 25 guineas; the Paul Bush Gold Medal in alternate years to best Resident Medical Officer at Royal Infirmary; Markham Skerritt Memorial Prize, awarded every three years to that member of University, not a member of Medical Board, who, in opinion of that Board, has published the best original work during the three years.

Bristol City Senior Scholarships and those offered by the Counties of Gloucestershire, Somerset, Wilts, and Dorset, and the City of Bath are tenable in the University. There is also a Miriam Badock Scholarship of the value of £120. The Beaverbrook Fellowship and some of the Fellowships awarded by the Colston Research Society for research in the University are allotted to the Faculty of Medicine. The Michael Hiatt Baker Scholarship of the value of £200 is open to graduates from New Zealand for research in the University.

Post-graduate Study.—Qualified medical practitioners may be appointed as clinical assistants for a period of one or more months. They may act as assistants, if times permit, in more than one department and in any of the hospitals during their period of study. They will be entitled to the use of the clinical laboratories and medical library, and have the right to attend in all departments, including operations, post-graduate and ordinary clinical demonstrations, and post-mortem examinations. Demonstration courses with weekly lectures are held from October to June inclusive.

All inquiries and applications for admission should be addressed to the Director of Post-graduate Studies (Clinical Section), Department of Medicine, University of Bristol, who can be seen on any day by appointment.

Further information as to scholarships, curricula, and fees can be obtained from the Dean of the Faculty of Medicine or the Registrar of the University.

UNIVERSITY OF WALES

The *University grants Degrees in Medicine, and* Diplomas in Public Health and Tuberculous Diseases. Preliminary courses of study for the Degrees in Medicine may be pursued at any of the constituent Colleges of the University—viz., at Aberystwyth, Bangor, Cardiff, or Swansea. The Welsh National School of Medicine is situated in Cardiff. All classes are open to both men and women students.

Particulars may be obtained on application to the Registrar of the University of Wales, University Registry, Cathays Park, Cardiff, or to the Secretary, *Welsh National School of Medicine, The Parade,* Cardiff.

ENGLISH MEDICAL CORPORATIONS GRANTING DIPLOMAS

CONJOINT EXAMINING BOARD

Under this heading we give the regulations for the *examinations enjoined by the Conjoint Examining* Board of the Royal Colleges of Physicians of London and Surgeons of England, and of the Society of Apothecaries upon students desiring their respective diplomas of qualification. We do not give any list of schools recognised by these bodies as eligible to prepare students for their examinations beyond mentioning that all the schools which we have already described (under the heading of the Universities to which they are attached) are recognised as suitable places of instruction by the corporations granting *medical diplomas.* The courses of study at the principal colonial medical schools are also recognised as qualifying for the examinations of these corporations.

Students of the Royal Colleges pass a Preliminary Examination in General Education recognised by the Board, and a *Pre-Medical Examination* in Chemistry, Physics, and Elementary Biology conducted by the Conjoint Examining Board before commencing the five years curriculum of professional study or some other examination recognised by the Board—namely, the examination in Chemistry, Physics, and Biology for the degree in Medicine of any University recognised by the Board; the Higher School Certificates of Oxford and Cambridge Universities, and the Oxford and Cambridge Schools Examination Board; the Higher Certificates of London, Bristol, Durham Universities, the Joint Matriculation Board of the Northern Universities, and the Central Welsh Board Higher Certificate. A candidate must enter for Chemistry and Physics together, and he will not be *allowed to pass in one without obtaining at the same* time at least half the number of marks required to pass in the other subject. No study of anatomy and physiology is recognised before this examination is passed. Not more than two terms of professional study (Anatomy and Physiology) will be recognised before Elementary Biology is passed. He will be *admitted to the examination on producing evidence* of having passed the required preliminary Examination in General Education. The examination is partly written, partly oral, and partly practical.

A candidate rejected in one or both subjects of the examination will not be admitted to re-examination until after the lapse of a period of not less than three months. The fee for the examination is £4 4*s*., for re-examination in Chemistry £2 2*s*., re-examination in Physics £1 1*s*., and re-examination in Biology £1 1*s*.

There are two Professional examinations called the *First* and *Final Examinations*. The courses of study for these examinations may be commenced before the Pre-Medical examination in Biology or some equivalent examination has been passed, provided that three terms of study are completed after the examination has been passed.

The subjects of the First Professional Examination are: Section I. (*a*) Anatomy, including Histology and Embryology. (*b*) Physiology, including Biochemistry. Section II. Pharmacology and Materia Medica. A candidate must have attended at a recognised Medical School courses of instruction in Anatomy, including Embryology, during five terms, during which he must have dissected the whole body, courses of instruction in Physiology, including Biochemistry during five terms, courses of instruction in Pharmacology, and Materia Medica. A candidate may present himself for the two Sections together or separately, but he must take parts (*a*) and (*b*) of Section I. together until he has passed in one or both parts, but a candidate will not be allowed to pass in one part unless he obtains at the same time at least half the number of marks required to pass in the other part.

Section II. of the examination may be passed at any time before the candidate enters for the Final Professional Examination, provided that the courses for Section I. have been completed. The fee for the First Professional Examination is £10 10*s*., for re-examination after rejection in Section I. £6 6*s*., for re-examination after rejection in either part of Section I. £3 3*s*., for re-examination after rejection in Section II. £3 3*s*. A candidate who produces satisfactory evidence of having passed an examination in the subjects of Section I. or of either part of Section I. and of Section II. in the examination for the degree in Medicine conducted at a University recognised by the Board will be exempted from further examination in such subjects.

Final Professional Examination.—The subjects of the Final Professional Examination are: Section I. Pathology (including Morbid Anatomy, Morbid Histology, and Clinical Pathology), and Bacteriology. Section II. Part I. Medicine, including Medical Anatomy, Forensic Medicine, and Public Health. Part II. Surgery, including Surgical Anatomy and the use of Surgical Appliances. Part III. Midwifery and Gynæcology. The examination is partly written, partly practical, partly clinical, and partly oral. A candidate may take Sections I. and II. and the three parts of Section II. of the Final Examination separately or may take the whole examination together. He will be required to produce the certificates required by the regulations before being admitted to the respective parts of the examination. The fee for admission to Section I. is £4 4*s*.; for admission to Section II., Part I., £10 10*s*.; Part II., £10 10*s*.; Part III., £6 6*s*.; and the re-examination fees are respectively £3 3*s*., £6 6*s*., £6 6*s*., and £5 5*s*. Members of recognised universities outside the British Possessions are admissible to the examinations of the diplomas of L.R.C.P. and M.R.C.S. under special conditions. Graduates in medicine and surgery are required to pass the first examination and to complete 24 months hospital practice before admission to any part of the final examination. Undergraduates are required to complete the full curriculum of 33 months for the final examination after having passed the first examination. For further information see the current regulations of the Conjoint Examination Board in England.

Members of certain recognised Indian, Colonial, and Foreign universities who have passed examinations for the Degree of Doctor or Bachelor of Medicine or Surgery in the subjects of the First Examination may present themselves for the Final Examination under special conditions. The Board also grants Diplomas in Public Health, in Psychological Medicine, in Ophthalmic Medicine and Surgery, in Tropical Medicine and Hygiene, in Laryngology and Otology, in Gynæcology and Obstetrics, and in Medical Radiology. Candidates must hold a Medical qualification registrable in the United Kingdom or be Graduates in Medicine of a recognised Indian, Colonial, or Foreign University. Particulars and conditions of admission to all examinations, fees, &c., may be obtained from the Secretary of the Examining Board, Examination Hall, Queen-square, London, W.C.1.

ROYAL COLLEGE OF PHYSICIANS OF LONDON

THE MEMBERSHIP AND FELLOWSHIP

The College confers two separate diplomas—the *Fellowship*, a purely honorary distinction, and the *Membership*, obtained by examination.

Membership.—The age for admission to this diploma, it will be noticed, has been changed from 25 to 23 years. The alteration in the by-law of the College is designed to enable men who have just finished house appointments to sit for an examination for which their recent clinical experience has exactly fitted them. The candidate must either have obtained the licence of the College, or a degree of Doctor or Bachelor of Medicine at a University which is registrable by the General Medical Council and is recognised by the Censors Board. The examination is directed partly to pathology and partly to the practice of medicine. Credit is also given to candidates who show a knowledge of Latin, Greek, French, or German. Further information may be obtained from the Registrar at the College. The fee for admission as a Member of the College is 40 guineas, except when the candidate for membership is a licentiate of the College, in which case the fee already paid for the licence is deducted from the 40 guineas. The fee for the examination is 10 guineas, which is reckoned as part of the fee for admission in the case of success.

Fellowship.—Fellows are selected annually from the ranks of Members by the Council of the College.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

THE FELLOWSHIP

The Royal College of Surgeons of England confers its diploma of Fellow upon a few distinguished persons in an honorary capacity. Two Members of long standing may also be elected to the Fellowship annually. But the bulk of the Fellows obtain the diploma as the result of examination.

Fellowship.—The examination for the Fellowship is divided into two parts—viz., the First Examination and the Second Examination. The subjects of the First Examination are Anatomy and Physiology and those of the Second Examination are Surgery, including Surgical Anatomy and Pathology. The examinations are partly written and partly vivâ voce, and include the examination of patients and the performance of operations on the dead body. The First Examination is held in June and December and the Second Examination in May and November.

The fees for examination are: First Examination, first admission 8 guineas, and for each readmission 5 guineas. Second Examination, each admission 12 guineas. The fee payable on admission to the Fellowship by Members is 10 guineas and by non-Members 30 guineas, in addition to examination fees.

A Member of the College is admissible to the First Examination at any time after receiving his Diploma of Membership. A candidate who is not a Member is admissible after passing the First Professional Examinations of the English Conjoint Board in Anatomy and Physiology, or the equivalent examination in his University, on the production of certificates of attendance upon prescribed courses.

A Member of the College is admissible to the Second

Examination at any time after having passed the First Examination on producing evidence of having been engaged not less than six years in the study (or study and practice) of the profession.

A candidate who is not a Member of the College must possess the registrable surgical and medical degrees of universities recognised by the Council and must have been engaged in the study (or study and practice) of the profession for not less than four years subsequent to the date of obtaining the recognised qualification, one year of which shall have been spent in attendance on the Surgical Practice of a recognised hospital. The diploma of Fellow is not conferred upon successful candidates until they have attained the age of 25 years.

BRITISH COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS [1]

The College was founded and incorporated in September, 1929. The objects of the College are set forth in the Memorandum of Association. The first, a very important object, is "To encourage the study and practice of Obstetrics and Gynæcology, subjects which should be inseparably interwoven."

The College consists of Fellows and Members, and has power to take part in the Examination of Candidates for admission to the British Register of Medical Practitioners, in coöperation with teaching and/or examining bodies authorised to conduct medical examinations for the purpose of qualifying candidates for admission to the British Register of Medical Practitioners, if invited by such bodies. It also has power to grant diplomas and certificates in Obstetrics and Gynæcology, either alone or in coöperation with teaching and/or examining bodies authorised to grant such diplomas, and steps are now being taken to implement this power.

This will provide the means for those who wish to act in a consultant or other capacity in regard to Maternity Services under County or Municipal control to produce evidence of efficiency in this work. The Secretary of the College will be glad to supply information on this subject which is at present in process of organisation.

Candidates for the Membership of the College have to show evidence of having held resident appointments in general medicine or surgery, and also in Obstetrics and Gynæcology, before entering for the examination. The Fellowship of the College is granted to those Members who are judged by the College to have advanced the science and art of Obstetrics and Gynæcology. The Fellowship and Membership of the College include practically every teacher of Obstetrics and Gynæcology in Great Britain and many distinguished exponents in the British Dominions.

The Fellowship or Membership of the College is now a necessary qualification for election to the staff of several obstetric and gynæcological hospitals, and it is hoped that in time it will be essential for election to the staff of all such hospitals. Consequently, all intending to specialise in these subjects should endeavour to obtain as soon as possible the Membership, the conditions and regulations of which may be obtained from the Hon. Secretary, British College of Obstetricians and Gynæcologists, 58, Queen Anne-street, London, W.1.

SOCIETY OF APOTHECARIES OF LONDON

The Pre-Medical and Primary Examinations are held quarterly. The Pre-Medical includes Chemistry, Physics, and Elementary Biology. The Primary includes Anatomy, Physiology, and Histology, Materia Medica, and Pharmacy. The latter examination cannot be passed before the completion of five terms' *Physiology and Practical Anatomy* with Demonstrations, and the first two subjects cannot be taken separately except in the event of the candidate having previously passed in one, and obtained at least half the marks required to pass in the other.

The Final Examination for the Licence (L.M.S.S.A. Lond.) is held monthly, except in September. (*a*) Principles and Practice of Surgery, including Surgical Pathology, Surgical Anatomy, Operative Manipulation, Instruments and Appliances. (*b*) Principles and Practice of Medicine, including Therapeutics, Pharmacology, Medical and General Pathology, Bacteriology, and Morbid Histology. (*c*) Midwifery, Gynæcology, Diseases of New-born Children, and the Use of Obstetric Instruments. (*d*) Forensic Medicine, Hygiene, Mental Diseases, and the Theory and Practice of Vaccination. The examination is partly written, partly practical, partly clinical, and partly oral. Sections *a*, *b*, *c*, and *d* may be taken at separate examinations, but there is no exemption from any part of the Final Examination.

The minimum period of medical study extends over five years (57 months), and three academic years (33 months) must elapse after a candidate has passed the examination in Anatomy and Physiology before he can complete the *Final Examination*. The course of study for the Final Examination includes attendance on the Surgical and Medical Practice with Post-mortem Examinations, at a hospital connected with a medical school for a period of three winter and three summer sessions, including a course of Practical Midwifery, with attendance on 20 Midwifery cases. The offices of dresser and clinical clerk must have been filled at a hospital or institution recognised by the Society.

The certificates prescribed by the Regulations must be produced before admission to the respective sections of the Final Examination.

Candidates intending to present themselves for examination are required to give 14 days' notice. The fee for the Pre-Medical Examination is 5 guineas, and for the Licence 20 guineas, which may be paid in two instalments of 10 guineas.

Master of Midwifery.—The examinations for this Diploma are held in May and November. Candidates will be admitted to the examination who have been registered practitioners for at least three years and who have held a resident appointment in an institution recognised by the Society for six months or more, and who for three months in each case have attended an antenatal clinic and an infant welfare centre, also recognised by the Society. Medical officers employed by a public health authority, and having special duties connected with Maternity and Child Welfare, will be admitted to the Examination on production of evidence to that effect. The examination will be conducted by written papers and by clinical and oral tests.

The entrance fee for the examination is £10 10*s*., and a further fee, which at present is fixed at £10 10*s*., must be paid before admission to the Mastery by those who have satisfied the examiners.

Candidates for the examination must send in their certificates to the Registrar, who will supply any other information.

The examination offices are open daily.

METROPOLITAN CENTRES AFFORDING EDUCATIONAL FACILITIES

Certain organisations and institutions provide for the needs of the medical student in his curriculum and for the post-graduate student requiring special forms of instruction and opportunities for clinical observation. Many of the institutions are recognised by the English Conjoint Examining Board as a place of study for the fifth year of the curriculum.

Special Diplomas in public health, tropical, psychological, and ophthalmic medicine, medical radiology and electrology, laryngology, otology, and tuberculosis are now granted in proof of intensive work along the different lines indicated. Of these, the Diploma in Public Health, being regulated by the General Medical Council, is registrable. Appointments to and promotion in the various Services are largely dependent on the possession of a particular diploma, and each syllabus of the special courses available at the institutions which follow, either with or without association with the Fellowship of Medicine, is planned to afford the necessary instruction.

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[1] The British College is placed with the English Corporations, but its advantages are open, as are those of the English Colleges, to all who can comply with the regulations.

The Special Diplomas are dealt with fully on p. 507, where the Bethlem Royal Hospital, the Maudsley Hospital, and the Diploma in Psychological Medicine are referred to. Similarly the Hospitals of the Metropolitan Asylums Board provide post-graduate as well as under-graduate facilities, while the hospitals of the Seamen's Hospital Society both supply the instruction necessary for the Diploma in Tropical Medicine and Hygiene, and coöperate in the activities of the Fellowship of Medicine and Post-Graduate Medical Association.

Infectious Hospitals of the London County Council

Classes of instruction in fevers for under-graduate medical students are given at the various hospitals. In addition, classes of instruction for the Diploma in Public Health, which comply with the rules of the General Medical Council for that diploma, are given at two of these hospitals—viz., the North-Western Hospital and the Brook Hospital. Full particulars relating to the classes at the hospitals may be obtained on application to the Medical Officer of Health, London County Council, Public Health Department (Special Hospitals), County Hall, Westminster Bridge, S.E.1.

Seamen's Hospital Society

The Society possesses six establishments: the Dreadnought Hospital at Greenwich, 250 beds; the Albert Dock Hospital, E.16, 53 beds; the Hospital for Tropical Diseases, Endsleigh-gardens, W.C.1, 76 beds; Tilbury Hospital, Tilbury Docks, Essex, 94 beds; King George's Sanatorium for Sailors, Bramshott, Hants, 80 beds; and the Angas Home, Cudham, 36 beds. Courses of operative surgery and surgical pathology are arranged by the London School of Clinical Medicine at the Dreadnought Hospital. Post-graduate Courses for Ship Surgeons are organised by the Society, Part II. (Tropical Medicine and Hygiene) being held at the London School of Hygiene and Tropical Medicine, commencing April 11th, and Part III. (Refresher Course in clinical subjects) at the Dreadnought Hospital, Greenwich, commencing in October.

The clinical teaching of the London School of Hygiene and Tropical Medicine is given at the Society's Hospital for Tropical Diseases, Endsleigh-gardens, W.C.1.

The Fellowship of Medicine and Post-Graduate Medical Association

Some 50 general and special London hospitals work in conjunction with this Association, which has its office at Room 28 in the House of the Royal Society of Medicine, 1, Wimpole-street, London, W. 1. Arrangements are made for courses in medicine and in surgery and the specialties, occupying the whole or part of each day for periods of one to four weeks. Daily clinical teaching arranged. Special evening clinical courses for the M.R.C.P. and F.R.C.S. (Final) Examinations are organised at intervals. Series of weekly lectures are arranged during the winter months. Courses and lectures arranged by the Fellowship of Medicine are open only to members of the Fellowship. The membership fee is £1 1*s.* per annum, which includes the subscription to the monthly *Post-Graduate Medical Journal*. The provisional list of Special Courses for 1934 will shortly be available. Full information regarding the courses of study, fees, &c., can be obtained from the Secretary.

GENERAL

Royal Northern Group of Hospitals

The Royal Northern Hospital, Holloway, London, N.7, is the main institution of the Royal Northern Group of Hospitals, which includes the Royal Chest Hospital, City-road, E.C., Grovelands Hospital (Recovery Branch), Southgate, the Maternity Nursing Association, and the Reckitt Convalescent Home, Clacton-on-Sea. The total number of beds in the group is 466. Besides the honorary staff, there are six anæsthetists, three pathologists, resident medical officer, three resident house physicians, three resident house surgeons, two resident casualty officers, one resident obstetric surgeon and one resident anæsthetist. The large rectangular and circular wards, each of which contains 25 beds, the maternity ward and children's ward for children up to 5 years of age, the observation wards in the new Casualty Department, the six operation theatres, and out-patient department are designed with a view of offering the greatest facilities for clinical work. The Special Departments include the following: Fracture, orthopædic, genito-urinary, and neurological, physicotherapeutic, pathological, tuberculosis, venereal diseases, and X ray (recently remodelled). Patients are removed to the Recovery Branch by ambulance a few days after operation. Demonstrations are given daily in the wards and out-patient departments. Clinical assistants (qualified), clinical clerks, and pathological clerks are appointed in the general and special departments, and may receive certificates at the end of their terms of office. A new maternity department has been opened, and the light department has been re-equipped. A complete hospital for paying patients has just been completed.

Weekly lectures by members of the hon. medical and surgical staff are free to all medical practitioners. Special classes and demonstrations are being arranged for post-graduates. They include instruction in general medicine and surgery, and also lectures and demonstrations in special subjects at the Royal Northern and Royal Chest Hospitals.

Prince of Wales's General Hospital

This hospital, situated in Tottenham, is in the midst of a densely populated neighbourhood, and contains medical, surgical, gynæcological, and children's wards, having 238 beds. There are special departments for gynæcological cases, diseases of the eye, ear, throat, and nose, skin diseases, medical electricity, radiography, and dentistry. Operations are performed every afternoon of the week (except Saturday) at 2.30 P.M. Clinical instruction is given in the wards and out-patient departments, laboratories, and lecture hall in connexion with the North-East London Post-Graduate College attached. There are six resident medical officers, and clinical assistants are appointed under certain conditions. Special intensive post-graduate courses are also held at intervals throughout the year. Further particulars in regard to the hospital may be obtained from the Dean.

West London Hospital

This hospital has 220 beds. Attached to the hospital is the West London Post-Graduate College. The practice of the hospital is reserved exclusively for qualified men. Instruction is given in the medical and surgical out-patient rooms and demonstrations are given in the wards. Clinical assistantships are obtainable in the various general and special out-patient departments. The accommodation for post-graduates consists of a lecture room, together with reading, writing, and class rooms. The hospital has a fully equipped pathological laboratory. The certificate of the hospital is accepted by the Admiralty, War Office, Colonial Office, and India Office in cases of study leave, and by the Conjoint Board of Examiners. Further information can be obtained on application to the Dean, Mr. Neil Sinclair, at the Hospital, Hammersmith, W. Secretary of the

Post-Graduate College, Mr. C. Cole, and of the Hospital, Mr. H. A. Madge.

National Temperance Hospital

The hospital (Hampstead-road, N.W.) contains 160 beds. The medical and surgical practice of the hospital is open to students and practitioners. Operations: Monday, 1.30 P.M.; Tuesday, 2.30 P.M.; Wednesday, 2 P.M.; Thursday, 8 A.M.; Friday, 11 A.M. Out-patient Departments for special diseases have been opened: Diseases of the Stomach and Disorders of Digestion, Dermatology, Ophthalmology, Oto-rhino-laryngology, and Chest.

Hampstead General and North-West London Hospital

In-patient Department: Haverstock Hill, N.W.; Out-patient Department: Bayham-street, Camden Town (138 beds—viz., 109 free, 8 isolation and observation, &c., and 21 paying or contributory). Serves Hampstead and the populous districts of Kentish Town and Camden Town. The out-patients, with the exception of Hampstead casualty and emergency cases, attend exclusively at the Out-patients' Department, Bayham-street, Camden Town. Further particulars from the Secretary at the hospital. There is a Post-graduate School free to the medical practitioners of the district. The hospital is also associated with the Fellowship of Medicine.

Metropolitan Hospital

This hospital has 150 beds, 17 of which are reserved for children. The adult accommodation includes special wards for the reception of Hebrew patients, and there is a Kosher kitchen and Jewish cook. Operations are held in the afternoons daily, except Saturdays and Sundays. The out-patient department is a large one, and has facilities for the treatment of all diseases; Jewish patients can attend special sessions. Special departments comprising: Neurological, Ophthalmic, Rectal Diseases, Diseases of Women, Genito-urinary, Diseases of the Throat and Ear, Eye and Skin, Electrotherapeutics, Dental, and V.D. Attached to the hospital is a Tuberculosis Dispensary for patients from the boroughs of Hackney and Stoke Newington. Further particulars may be obtained from the Secretary of the Medical Committee (Dr. Hugh A. Dunlop), or from Mr. Geo. W. Cooling, the Secretary, at the hospital, Kingsland-road, E.8.

Queen Mary's Hospital for the East End

This hospital has developed from the West Ham and Eastern General Hospital. It has 219 beds and ministers to a very poor public. Founded as a dispensary in 1861, and developing into a hospital in 1890, steady extensions have been made during this century. A Royal Charter was obtained in 1917, and the hospital has become a valuable charity with a full medical staff of physicians and surgeons, and specialists for gynæcology, obstetrics, ophthalmological surgery, radiology, dermatology, and dental surgery. The Fellowship of Medicine and Post-Graduate Medical Association make frequent use of the opportunities here offered. Particulars may be obtained from Major Raphael Jackson, Secretary, Queen Mary's Hospital, Stratford, E.15.

NEUROLOGY

National Hospital, Queen-square

The hospital, with the Convalescent Home at East Finchley and branch at Clapham Park, contains 265 beds and cots. The out-patient physicians attend every Monday, Tuesday, Wednesday, Thursday, and Friday at 2 P.M., and the physicians daily. Clinical clerks are appointed under physicians and clinical assistants to out-patient physicians. Post-graduate Courses of Lectures and Demonstrations are held twice every year, usually commencing in January and October, and lasting about ten weeks. Special courses in Neurological Ophthalmology, Neuropathology, and the Anatomy and Physiology of the Nervous System are given. The Pathological Laboratory is available for special work under the Pathologist.

West End Hospital for Nervous Diseases

This institution is recognised by the University of London and by the Conjoint Board as a school of instruction in Neurology for the M.D. degree, Branch III., and for the D.P.M. The Out-patient Department is in Welbeck-street, W.; the In-patient Department is at Gloucester-gate, Regent's Park, and contains 78 beds. Completely equipped with pathological and other special departments, the hospital offers every facility for instruction in Neurological subjects. In conjunction with Bethlem Royal Hospital it offers courses of instruction for the D.P.M. The hospital coöperates with the Fellowship of Medicine in the programmes of special post-graduate teaching organised by the Association. The practice of the hospital is open to students and practitioners by arrangement. Appointments as Hon. Clinical Assistants in the Out-patient Department are open to registered medical practitioners. Senior and Junior Resident House Physicians are appointed for a period of six months in the first place with remuneration at the rate of £150 and £100 per annum, respectively. The Savill Memorial Prize (value £15) and Medal are offered biennially for competition among post-graduate students who have attended the practice of the hospital or any special course. Full particulars may be obtained from Dr. C. Worster-Drought, Dean, or J. P. Wetenhall, Secretary, 73, Welbeck-street, W.

Hospital for Epilepsy and Paralysis

This hospital in Maida Vale, W., contains 88 beds, including 20 private wards and 6 pay beds. Both in-patient and out-patient departments are open free to students, as well as to medical graduates. The out-patient department is open every week-day except Saturday at 2 P.M.

HEART AND LUNGS

Royal Chest Hospital

The Royal Chest Hospital, City-road, E.C. (associated with the Royal Northern Group of Hospitals, see p. 471), is the oldest chest hospital in London. It has accommodation for 84 in-patients and a large out-patient department, where out-patients are seen daily at 2 P.M., except Saturdays. Special departments include Thoracic Surgery, Laryngology, Radiology, Electrocardiograph, Massage and Physical Exercises, and an Ultra-violet Light clinic. Clinical Assistants are appointed to work with the physicians in the out-patient department. The Tuberculosis Dispensary for Islington South is attached to the hospital.

Brompton Hospital for Consumption and Diseases of the Chest

The hospital contains 344 beds, of which 30 are allocated to the Surgical side and 98 to Paying Patients. A further 150 beds are provided at the Sanatorium at Frimley, which also contains beds for paying patients. The beds for paying patients at the hospital are so divided up as to provide Wards of two and five beds each at a small inclusive fee, and single bedrooms in which the fees are non-inclusive. Six Resident House Physicians are appointed for a term of six months each. Their duties include attendance in the out-patient and special departments, and one serves as Assistant to the Tuberculosis Officer for Chelsea. At the conclusion of their term of office each is eligible for an additional month's residence at the Sanatorium. Post-graduates are admitted to the practice of the hospital. Clinical assistants are appointed to the out-patient physicians and clinical clerks to the in-patient physicians. Clinical demonstrations in the Wards, the out-patient and special departments are given throughout the year, and two special post-graduate courses are held annually, along with week-end and other courses. Special courses are also held in the Pathological Department. The medical practice of the hospital is recognised by the Conjoint Board, the University of London, the Apothecaries Society, and the Army and Navy and Indian Medical Boards. Four special courses for students of eight demonstrations each are held during the year before each final Conjoint Board Examination. For further particulars application should be made to the Dean, Dr. W. J. Fenton.

City of London Hospital for Diseases of the Heart and Lungs

(186 beds). Special Departments: Surgical, Laryngological, Bronchoscopical, Radiological, Pathological, Electrocardiographic. Assistants are appointed to the Clinics, and a limited number of research workers to the Pathological Department. The in-patients staff visit generally in the afternoon; out-patients at 2 P.M. Graduates are admitted on payment of fees which entitle them to attendance at clinics, post-mortem demonstrations, and operations. Special demonstration and lecture courses are provided, and a club room. Graduates desiring Assistantships in any department should address applications to the Head of that department. A Tuberculosis Dispensary (Boroughs of Bethnal Green and part Hackney) is established at the Hospital, Victoria Park, E.2.

National Hospital for Diseases of the Heart

The practice of the hospital (founded 1857), both in the wards and out-patient department, is open daily to post-graduates and others. Systematic courses of instruction, with lectures and clinical demonstrations, are arranged during the winter and summer sessions; in addition an intensive course, of a fortnight's duration, takes place in January, July, and October of each year. The hospital is fully equipped with all the modern instruments for the investigation of the diseases of the cardiovascular system, and facilities exist for those requiring practical instruction in electrocardiography, X rays, and other graphic methods. Clinical Assistants in the out-patient department are appointed from time to time. The hospital is situated in Westmoreland-street, London, W.

DISEASES OF WOMEN AND CHILDREN

Hospital for Sick Children

This hospital in Great Ormond-street, W.C., contains 252 beds. The practice is open to students of both sexes who have completed four years of medical study and also to qualified medical men and women. The medical staff are recognised by the University of London as teachers in Diseases of Children. Arrangements have also been made with the London School of Medicine for Women for the routine admission of their students to clerkships in the wards. Clinical instruction is given daily by members of the visiting staff. Clinical Clerks are appointed once a month. In the pathological department facilities are afforded to post-graduates for obtaining theoretical and practical instruction in Clinical Pathology and Bacteriology, and in Medical Biochemistry in the Pathological and Biochemical Laboratories. Time spent in clerking and dressing is recognised by the Universities of London, Oxford, and Cambridge, as well as by the Conjoint Board for England as part of the final curriculum. These appointments are open to students of all recognised medical schools. In addition, special courses for a fortnight, in the mornings, are held from time to time (generally in May and October), as well as routine post-graduate instruction daily.

Queen Charlotte's Maternity Hospital and Midwifery Training School

This hospital, formerly Queen Charlotte's Lying-in Hospital, is situated in Marylebone-road, N.W. The hospital receives over 2700 patients annually, besides having a large out-patient department. Medical students and qualified practitioners are received at all times of the year. They have unusual opportunities of seeing obstetric complications and operative midwifery on account of the very large number of primiparous cases—nearly one-half of the total admissions. Clinical instruction is given on the more important cases which present themselves. They also receive valuable instruction in the Antenatal and Child Welfare Departments, where over 4000 patients attend yearly. Special Lecture-demonstrations are given by members of the staff. Certificates of attendance at this hospital are recognised by all the Universities, Colleges, and licensing bodies. Pupil midwives and maternity nurses are received and specially trained. A Residential College provides accommodation for students and qualified practitioners (both men and women), and is opposite the hospital, with which it is in telephonic communication.

Arrangements have been made for Medical Students to receive the preliminary instruction in Practical Midwifery recommended by the General Medical Council.

The Isolation Block (30 beds) for Puerperal Fever and Puerperal Pyrexia, which has been built on the new site at Ravenscourt Park, Hammersmith, was opened for the reception of patients in September, 1930, and the Research Laboratories, which have been erected adjoining this block, are now in full working order. Students may attend the clinics conducted by the staff at the Isolation Block.

City of London Maternity Hospital and Midwifery Training School

This hospital (City-road, E.C.) receives nearly 1700 in-patients annually, in addition to attending mothers in their homes. Monthly or fortnightly residential courses are provided for two Medical Students at a time and facilities are offered to Post-graduates to see the work of the Antenatal Clinics on three mornings weekly. Pupil Midwives and Maternity Nurses receive the recognised course of training, assisted by a Sister Tutor.

Royal Waterloo Hospital for Children and Women

This hospital, founded at the date indicated by its title, has within recent years undergone considerable extensions and has now 130 beds, while the latest buildings include a Nurses' Home, a new Operating Theatre, and private pay beds. It has a full staff of surgeons, physicians, and gynæcologists, and also special departments. Amongst the many new additions to the equipment of the hospital is an Electrocardiograph apparatus. A new Orthopædic Department is in use, and the Physiotherapeutic and Electrical Department has been extended and re-equipped. There are facilities for post-graduates to attend the general and special clinics in medicine and surgery for in-patients, and for out-patients, including a genito-urinary clinic, a clinic for varicose veins, a L.C.C. Clinic for children suffering from rheumatic fever and chorea, and the X ray department for gastro-intestinal diagnosis. Particulars of post-graduate courses, which are held from time to time, can be obtained from the Secretary of the Hospital, Waterloo-road, S.E., or from the Fellowship of Medicine.

Victoria Hospital for Children

This hospital in Tite-street, Chelsea, S.W., contains 138 beds and a large out-patient department; the home at Broadstairs has 50 beds. There are two private wards where patients may be under the care of any medical practitioner holding an appointment on the staff of a recognised hospital, and the question of payment for his fees is arranged between him and the child's parents. Application for admission should be made to the Secretary.

Queen's Hospital for Children

This hospital, for the sick children of the poor up to 14 years of age, was formerly known as the North-Eastern Hospital for Children. There are 160 beds in London (Hackney-road, E.2.) and 44 at the seaside branch, "Little Folks" Home, Bexhill. Special departments in Ear, Nose, Throat, Skin, and Eye, and Dentistry. Rheumatic Clinic in coöperation with L.C.C. schools twice weekly. A radiologist attends four times weekly. There are massage and light departments, and a special whooping-cough physician. The practice of the hospital is open to students by arrangement with the medical staff, and post-graduate instruction in children's diseases, lectures and demonstrations are given at times notified by the Fellowship of Medicine.

Paddington Green Children's Hospital

This is a small hospital (42 beds) with a large out-patient department and a full staff, with Eye, Ear, Skin, Light, and Dental departments. The facilities which it offers for observation of clinical practice are used by the Fellowship of Medicine.

Hospital for Women, Soho

This hospital in Soho-square, W., contains 81 beds. The teaching is available for post-graduates only in limited numbers. Operations take place on Tuesdays, Wednesdays, and Thursdays at 2 P.M. and on Mondays and Fridays at 9.30 A.M. The X ray department is supplied with the latest installation both for diagnosis and treatment, and experience can also be gained in the treatment of malignant disease by means of radium. Incorporated is the London School of Gynæcology, comprising attendance in out-patient department, operating theatre, clinical lectures, and X ray treatment.

Samaritan Hospital for Women

Contains 70 beds. Qualified practitioners are admitted as clinical (gynæcological) assistants to both the in- and out-patient departments. Full particulars may be obtained from the Secretary to the Medical Committee at the hospital, Marylebone-road, N.W.

Princess Elizabeth of York Hospital for Children (formerly East London Hospital for Children and Dispensary for Women)

There are 140 beds. Clinical instruction in Pædiatrics is given to fifth-year Students at the hospital in Glamis-road, Shadwell, E. Two clinical clerkships for qualified or unqualified students are open every three months. Clinical assistants are from time to time appointed in the out-patient department. There is an Orthopædic Clinic on Wednesdays and a Rheumatism Clinic on Fridays. Special instruction in Infant Feeding. Post-graduate Clinical Demonstration on the third Wednesday in each month at 3.30 P.M.

Chelsea Hospital for Women

This hospital, situated in Arthur-street, Chelsea, S.W., has 100 beds, and 18 are reserved for patients paying £5 5s. a week and moderate fees to the surgeons for operations. There is a convalescent home of 32 beds at St. Leonards. In the out-patient department the patients are seen at a nominal payment or with subscribers' letters. The hospital caters for post-graduate teaching. In the out-patients' department clinical assistantships can be obtained which entitle the holder to attend and examine patients under the instruction of the visiting surgeons. The operating theatre is open to visitors, and all operations are demonstrated and discussed by the surgeons. The Pathological Department contains one of the finest gynæcological museums in the country, and full particulars are available for each specimen. Special intensive courses, with lectures and special demonstrations, are held three times a year through the organisation of the Fellowship of Medicine.

Evelina Hospital and Belgrave Hospital

The Evelina Hospital, Southwark (80 cots), and the Belgrave Hospital (76 cots), Clapham-road, also give facilities for out-patient practice.

CANCER

Cancer Hospital (Free)

The hospital, situated in Fulham-road, S.W., contains 134 beds for poor persons afflicted, who are admitted free. The Out-patient Department is open every week-day, except Saturday, at 2 P.M., also Wednesday morning at 10 and Saturday morning at 11. A course of study in Physics and Radiology, qualifying for the Diploma in Medical Radiology, is given. The hospital is a recognised teaching school of the University of London, in Medical Radiology, Experimental Pathology, and Pathological Chemistry. Senior and Junior Resident House Surgeons are appointed for a period of six months at a salary at the rate of £100 per annum.

Mount Vernon Hospital

The hospital contains 150 beds for surgical cancer cases. Clinical Demonstrations are given by the visiting Surgical Staff at the hospital at Northwood. Clinical assistants are appointed to surgeons in the wards. Diagnostic and follow-up departments, 14, Riding House-street, W. Further information can be obtained from the Secretary, 32, Fitzroy-square, W.

Marie Curie Hospital

This hospital, which is officered by medical women, is a radium centre for the treatment of women suffering from cancer and allied diseases. The In-patient Department contains 30 beds, including some private wards. There is a daily Out-patient Clinic to which cases are sent for diagnosis and at which the cases already treated by radium are kept under observation. An X Ray Department is being opened in the early autumn of 1933. The practice of the hospital is open to graduates and under-graduates wishing to study the subject of radium treatment. The hospital is situated in Fitzjohn's-avenue, London, N.W.

OPHTHALMOLOGY

Royal London Ophthalmic Hospital

The attendance at Moorfields Eye Hospital (Moorfields, 1804–1899), City-road, E.C. (152 beds) is now very large. Operations are performed each day from 10 A.M. to 1 P.M. and four surgeons attend daily. Students are admitted to the practice of the hospital and special courses of instruction are given, which extend over a period of five months, by members of the surgical staff and certain outside lecturers, beginning in October and March. The instructions and classes are arranged to meet the requirements for the various diplomas in Ophthalmology, both for the preliminary examinations in Anatomy, Physiology, and Optics, and those subjects required in the second part. Students of the hospital are eligible as house surgeons or clinical and junior assistants. House surgeons are appointed every six months, clinical and junior assistants every three months. During the past few years certain improvements have been made. A floor of private wards has been opened and the capacity of the hospital increased, and at the moment the out-patients' department is being rebuilt, together with the Medical School, including the Pathological and Bacteriological Departments. When these are finished the arrangements for instruction will be very much improved. Application for further information should be made to the Dean, Mr. C. B. Goulden, O.B.E.

Royal Westminster Ophthalmic Hospital

This hospital, in Broad-street, Holborn, W.C. (86 beds, including 14 rooms for paying patients), has recently removed from its original site at Charing Cross to much larger premises, well adapted for teaching purposes. The clinics are held in the afternoons from 1 P.M. Operations are performed daily in the theatre at 3 P.M. Lectures and practical classes in the various branches of Ophthalmology, including Operative Surgery, Bacteriology, and Pathology, are held during the winter and summer sessions at 5 P.M. The practice of the hospital is open to both men and women practitioners, and medical students. Post-graduate students at the hospital are eligible for appointment as house surgeon, assistant house surgeon, refraction assistant (seven appointments paid), and senior and junior assistants.

Royal Eye Hospital

There are 44 beds and 2 cots at the hospital in St. George's-circus, Southwark, S.E. Clinical instruction is given to students and post-graduates daily at 2.30 P.M., and Lectures, Demonstrations, and Laboratory Classes are arranged in preparation for examinations in Ophthalmology. Apparatus has been installed for the Microscopy of the Living Eye. Post-graduate students are eligible for appointment as Clinical Assistants and as Refraction Officers. A new clinic for paying patients under the Voluntary Hospitals Ophthalmic Clinic Scheme is held at 6 P.M. Mondays, Tuesdays, and Thursdays, and also a squint Clinic is now in operation. D.O.M.S. Courses are also held for Part I. and Part II. Fees and other particulars can be obtained from the Dean of the Medical School.

Central London Ophthalmic Hospital

This hospital, in Judd-street, St. Pancras, W.C., has 51 beds, and clinical teaching is given daily. Classes of instruction in the use of the ophthalmoscope, with demonstrations on cases, and also classes on other subjects, to meet the requirements of the Conjoint Board for the D.O.M.S., and of the University of London for the M.S. in Ophthalmology, are given during the winter months, commencing in October. This school is recognised as a teaching institution by the Universities of London and Oxford, as well as the English Conjoint Board. It receives a portion of the pupils of the University College Hospital for the purposes of ophthalmic training. The Pathological and Bacteriological Laboratories have been rendered available for the use of any ophthalmic surgeons who desire to send specimens for examination. A small fee is charged for a report. An Orthoptic Department for the treatment of cases of squint has been established, and pupils are taken for training in this work. A clinical Demonstration is held by members of the staff at the Central London Ophthalmic Hospital at 5 P.M. on the first Tuesday of every month. Doctors and students of medicine are admitted free.

GENITO-URINARY AND VENEREAL DISEASES

London Lock Hospital and Home

In the institution at Harrow-road, W., founded 1746, there are 70 beds for men, women, and children. Male out-patients are seen at 91, Dean-street, Oxford-street, W.1, at any time from 10 A.M. until 10 P.M. daily (Sunday, noon–10 P.M.). Intravenous injections are given at every clinic. Irrigations for males are given daily from 9 A.M. to 11 P.M. Female out-patients and children are seen daily at 283, Harrow-road, Paddington, W.9, from 9 A.M. until 8 P.M. Irrigations for females are given at any time. The hospital is linked up with the Fellowship of Medicine; special courses of lectures are held in May and November each year, and application for tickets should be made direct to the Secretary of the Fellowship. Only a limited number of practitioners and students are permitted to attend the practice of the Female Lock Hospital, and application should be made to the Dean at the Male Lock Hospital between the hours of 11 A.M. and 5 P.M.

St. Mark's Hospital for Cancer, Fistula, and other Diseases of the Rectum

At St. Mark's Hospital for Cancer, Fistula, and other Diseases of the Rectum, City-road, E.C. (founded 1835), for men and women, there are 63 general beds and 9 private beds. Operations are performed on Mondays, Tuesdays, Wednesdays, and Thursdays at 2.30 P.M. and Saturdays at 11 A.M. Medical practitioners and students are invited to the operations and to the clinical instruction in the wards and in the out-patient department. Two weekly courses are held during the year in coöperation with the Fellowship of Medicine. Weekly lectures (free) every Thursday at 4.30 P.M. to post-graduates.

St. Peter's Hospital

The scheme for remodelling St. Peter's Hospital for Stone, Covent Garden, W.C., was completed at the end of 1931, and there are now available 33 male and 6 female beds, which include accommodation for paying patients. The Hospital is thoroughly up to date in all departments, and research is still carried out with Radium specially loaned for the purpose by the British Empire Cancer Campaign. Medical practitioners and students are invited to attend the practice of the Hospital in the out-patient department, excepting that the only clinic open to medical women is that held at 9.30 A.M. Fridays for women and children. The operating theatre is open to medical visitors as follows: Mondays, Tuesdays, Thursdays 2 P.M., Fridays 2.30 P.M. There is a Museum in the new Department of Pathology (10, Henrietta-street, W.C.2) open to post-graduate students, and special lectures, which are free, are held there every Wednesday at 3 P.M., holiday months excepted. There are also intensive courses of lectures and demonstrations twice yearly, in May and November by arrangement with the Fellowship of Medicine.

All Saints' Hospital

The in-patient department (55 beds, including 4 private wards and 6 cubicles) of the *All Saints'* Hospital for Genito-Urinary Diseases is at Austral-street, West-square, St. George's-road, S.E., and the terms of admission are free or by payment according to means. The out-patient department provides clinical instruction through the Fellowship of Medicine, in addition to which demonstrations in cystoscopy and other branches of genito-urinary work are available for all medical practitioners at the Out-patient department on Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday afternoons at 2 P.M., without fee.

ORTHOPÆDICS

Royal National Orthopædic Hospital

This institution, situated in Great Portland-street, W. (480 beds), is a good example of the fusion of small and scattered activities for the creation of an effective whole. The three orthopædic hospitals of the metropolis were combined for the formation of this central institution at the instance of the King's Hospital Fund, with the result that the grants from this Fund and the income from subscriptions can now be used to far better purpose and with economy. The hospital has also been approved by the Ministry of Health for the treatment of surgical tuberculosis, the connexion between orthopædics and the therapeutics required in many forms of tuberculosis having become obvious. Country branch at Brockley Hill, Stanmore (280 beds). Both branches of the hospital are residential schools for physically defective children, certified by the Board of Education. A post-graduate course of 14 days is held about March each year. The out-patient department is open every week-day, except Saturday, at 1.30 P.M. The Evening Clinic on Tuesdays from 6 P.M. to 8 P.M.

EAR, NOSE, AND THROAT

Central London Throat, Nose and Ear Hospital

This hospital in Gray's Inn-road, W.C., is open daily to all qualified medical practitioners on presentation of their visiting cards. Demonstrations of the cases and clinical instruction are given daily by the chief surgeon of each clinic. Lectures each Friday at 4 P.M. An intensive Course of Lectures (especially suitable to D.L.O. students), with Anatomy and Physiology Class, Operative Surgery Class, Peroral Endoscopy Class, and Pathology Class is given twice yearly—in May and October. Preparatory courses in methods of Examination and Diagnosis at frequent intervals. Consultations on interesting cases take place on the fourth Wednesday in each month at 4 P.M. Clinical Assistants are appointed and are expected to hold office for at least three months. They are required to attend twice weekly at 1.30 o'clock for the afternoon, and at 4.30 o'clock for the evening clinics. New wing, with complete out-patient department and additional wards, was opened in August, 1929, and a Recovery Home at Ealing with 26 beds was opened in July last.

Golden-square Throat, Nose and Ear Hospital

The hospital has absorbed the London Throat Hospital, formerly of Great Portland-street. The hospital is situated in Golden-square, near Piccadilly-circus. Clinical instruction in the diagnosis and treatment of disease is given daily in the out-patient department from 2 to 5 P.M., and on Tuesdays and Thursdays from 6.30 to 8 P.M. There is an annual out-patient attendance of over 55,000. Minor operations are performed on Mondays, Wednesdays, and Fridays at 9.30 A.M. The hospital now contains 101 beds, of which 15 are for private patients. There are also two contributory wards at 4 guineas a week inclusive. Practitioners and medical students are admitted to the practice of the hospital, and clinical assistants are appointed periodically.

Metropolitan Ear, Nose, and Throat Hospital

The hospital (founded 1838) is in Fitzroy-square, W. The Out-patient Department is opened daily at 2.30 P.M., Saturdays 1.30 P.M., to all medical practitioners and senior students for acquiring clinical instruction and technical knowledge. Operations upon in-patients are performed on Tuesdays, Wednesdays, Thursdays, and Fridays at 10 A.M. Clinical Assistants are appointed as vacancies occur.

SKIN

London School of Dermatology

The London School of Dermatology, St. John's Hospital for Diseases of the Skin, 49, Leicester-square, W.C., has an in-patient department (40 beds) at 262, Uxbridge-road, W., and out-patient Clinics are held daily at 2 and 6 P.M. (Saturdays 2 P.M. only), when demonstrations are given on the cases presenting themselves. The Chesterfield Lectures, constituting a systematic course in dermatology, are given on Tuesdays and Thursdays at 5 P.M., from October to March, by the hon. medical staff of St. John's Hospital and the physicians in charge of the Dermatological Departments of the London Teaching Hospitals. The lectures are free to those attending the practice of the hospital and to registered medical students. At the end of the course an examination is held for the Chesterfield Medal in Dermatology, and is open to all medical practitioners. A summer course of lectures is also held during the month of May each year. The electrical department is open daily from 2 to 4 P.M., except on Wednesdays and Saturdays. Laboratory Courses in the Pathology and Bacteriology of the Skin can be arranged.

London Skin Hospital and Hospital for Diseases of the Skin

The London Skin Hospital (Fitzroy-square) and the Hospital for Diseases of the Skin (Blackfriars-road) admit graduates to their practice, which is among out-patients. London Skin Hospital, daily at 2 P.M. and 5.30 P.M.; Hospital for Diseases of the Skin, daily at 2 P.M., and Fridays, 5.30 P.M.

CENTRES OUTSIDE LONDON AFFORDING EDUCATIONAL FACILITIES

Nearly every hospital of a general character in the country having more than 150 beds falls within this category, and certain of them have already been noticed in connexion with the universities to which their clinical practice is attached. The hospitals vary much in size and scope.

The following alphabetical list includes the provincial hospitals which are recognised by the English Conjoint Board for a part of the required training in medical and surgical practice through clerkships and dresserships.

Bath Royal United Hospital

This hospital contains 284 beds of modern construction, 72 of which are for paying patients only; possesses X Ray, Massage, Bacteriological Departments, a Pathological Laboratory, Obstetric, Ear, Nose, and Throat, and Skin Departments. Secretary-Superintendent: Mr. J. Lawrence Mears. V.D. Clinics are held on Tuesdays (for women), and on Fridays and Saturdays (for men), at 5 P.M.

Bedford County Hospital

This hospital at Bedford has 124 beds, including 15 beds in the paying and 13 beds in the maternity wards; Ear, Nose, and Throat Departments, and X Ray and Pathological Departments. There is in connexion with the institution a convalescent home (20 beds) at Aspley Heath, near Woburn Sands. The hospital is approved by the University of London for the M.D. and M.S. Examinations. Secretary: Mr. B. Wadmore.

Berkshire Royal Hospital

This hospital at Reading, which contains 268 beds, includes an Out-patient Department, a Casualty Department, an X Ray and Radiotherapeutic Department, Electrotherapeutic and Massage Department, an Orthopædic Department, a V.D. Clinic, a Laboratory, an Eye Theatre, Eye Wards, a Maternity Ward, a Paying Patients Unit, and a Private Nursing Staff, and two motor ambulances. The hospital is approved as a Training School for Nurses and by the Ministry of Health for V.D. Treatment. The Blagrave Branch, Calcot, opened in 1930, contains in addition to the above, 63 beds for cases of disease of bones and joints and those requiring open-air treatment.

Bradford Royal Infirmary

This hospital at Bradford contains 215 beds and, in addition, has 50 recovery beds at the Woodlands Convalescent Home, Rawdon. The acting staff consists of 4 Honorary Physicians, 4 Honorary Surgeons, 1 Honorary Radiologist, 1 Honorary Laryngologist, 1 Honorary Ophthalmic Surgeon, 1 Honorary Dental Surgeon, 1 Honorary Assistant Dental Surgeon, 2 Honorary Assistant Physicians, 2 Honorary Assistant Surgeons, 6 Anæsthetists, 1 Pathologist, 1 Physician-in-charge of Radium Therapy Department, 1 Resident Surgical Officer, 1 House Physician, and 4 House Surgeons. There are special clinics for Orthopædic cases, for Electro-therapeutic and Sunlight Treatment, and for Radium Therapy. A new hospital of 336 beds is in construction, and a self-contained block for 70 paying patients has been opened adjoining the new Infirmary. Secretary-Superintendent: Mr. J. J. Barron.

Coventry and Warwickshire Hospital

There are 307 beds available at the Main Hospital at Coventry (established 1840), and 40 beds at the Alcock Convalescent Hospital, Keresley (three and a half miles distance), which is used as an annexe. At the Main Hospital there are separate Medical, Surgical, Maternity, Children's, and Accident Wards, also separate Ophthalmic Block complete with its own Theatre. There are separate departments for Clinics for Ear, Nose, and Throat Diseases, X Ray, Electrical, and Sunlight Clinics, also V.D. Clinic. There is also an up-to-date Pathological Laboratory and Cardiograph Department.

Derbyshire Royal Infirmary

This general hospital at Derby (350 beds) was rebuilt in 1892–94. In recent years there have been numerous alterations and additions to keep pace with modern requirements. The hospital is built on the pavilion system and provides, in addition to the usual Medical and Surgical blocks, a separate

Ophthalmic block of 40 beds, a separate Children's block of 34 beds (Medical and Surgical), Gynæcological Wards, and an Ear, Throat, and Nose Department. There is a large and well-equipped Out-patient Department, also separate Orthopædic, X Ray, Electrical, Pathological, and Venereal Diseases Departments. The salaried Medical Staff consists of a non-resident Staff of 1 Surgeon-in-charge of X Ray and Electrical Departments, 1 Surgeon-in-charge of Venereal Diseases Department, 5 Anæsthetists, and a Resident Staff of 4 House Surgeons, 1 House Physician, and 1 Assistant House Surgeon and Casualty Officer. Registered Medical Students are admitted to witness the medical and surgical practice on payment of fees. Superintendent and Secretary: Mr. Walter Banks, F.C.I.S.

Devon and Exeter Royal Hospital

The hospital at Exeter contains 225 beds (including special children's wards) and has a good library, museum-post-mortem room, and pathological laboratory. Attendance on the practice of this hospital qualifies for all the examining boards. There is also a Private Nursing Staff attached to the hospital. For particulars as to fees, &c., apply to the Matron. A new wing was added in 1897 and the "Victory" wing for the treatment of discharged disabled soldiers and sailors completed and opened in 1922. Doctors in practice may use the museum and library. The Electrical Treatment Department, opened in 1907, was enlarged in 1925, and now forms one of the most important sections of the hospital. At the department for the treatment of genito-urinary diseases there are three sessions per week, two for men at 3 P.M. and 7 P.M., and one for women at 3 P.M. A new Nurses' Home is in course of erection and a new Out-patients' Department and other extensions are contemplated in the near future.

Devon (South) and East Cornwall Hospital

This hospital at Plymouth has 240 beds (including 10 for venereal diseases in a separate building). Special departments include Pathological, X Ray, Deep Therapy, Cardiographic, Ultra-Violet Rays, Electrotherapeutic, Orthopædic, Gynæcological, and Aural; also medical and surgical out-patients. Pensioners are received as in-patients, and are also treated as out-patients. The hospital has been approved by the National Radium Commission as a Regional Centre for the South-West.

Gloucestershire Royal Infirmary and Eye Institution

This hospital at Gloucester has 216 beds. Secretary: F. J. Symons. An Electrical and Massage Department has been established and Venereal Clinic opened. Also Ear, Nose, and Throat Department, X Ray Department, Ultra-violet Ray Department, Orthopædic Department, Dental Department, Pathological Laboratory, and Neurological Clinic. Sixteen beds for paying patients in new block.

Hampshire Royal County Hospital, Winchester

This hospital, which was founded in 1736, contains 158 beds. There is a private nursing staff attached. The building and amenities are completely up to date; there are an efficient Out-patient Department, a Pathological Laboratory, and an Electrical and Massage Department. A new Children's Block has been opened.

Hull Royal Infirmary

This hospital at Hull contains 270 beds, plus 100 beds at the branch hospital at Sutton-on-Hull, opened in February, 1931. Since the establishment of the Parent Institution in 1782 it has undergone steady additions and improvements, including up-to-date Ophthalmic, Radiological, Nose, Throat, and Ear, Dental, V.D., Violet Rays, and Pathological Departments. A Clinic for Functional Nervous Diseases was opened in 1931 in conjunction with the Hull Corporation, under the Mental Treatment Act, 1930. Recent extensions include a new Operating Theatre, Nurses' Home, and extensions to the old X Ray, Electrical, and Out-patient Departments. The Resident Staff consists of 1 Resident Surgical Officer, 2 House Physicians, 3 House Surgeons, 1 Surgeon to Special Departments, 1 Casualty Officer. Sutton Branch: 1 House Surgeon and 1 House Physician. An annexe at Withernsea has accommodation for 30 patients. The senior house physician's appointment is recognised by the University of London for the M.D., Branch I. (General Medicine) examination. It also recognises the posts of senior house surgeon and second house surgeon for the M.S., Branch I. (General Surgery) examination. The post of house surgeon to the Special Departments is recognised by the Conjoint Board of the Royal Colleges for the examinations for the Diplomas in Ophthalmic Medicine and Surgery, and Laryngology and Otology. The hospital is also recognised by the Royal Colleges for the F.R.C.S. examinations.

Kent and Canterbury General Hospital

The hospital at Canterbury contains 137 beds. Pupils of the staff are admitted to the practice of the hospital. Operations daily. Special departments include Ophthalmic, Ear, Nose and Throat, Venereal, Orthopædic, Electrical, Actinotherapeutic, X Ray, and Bacteriological. Accommodation for paying patients is available. The hospital is recognised by the University of London for the purpose of the M.D. and M.S. examinations. Superintendent and Secretary: Mr. W. T. Southwood.

Leicester Royal Infirmary

At the Leicester Royal Infirmary there are 475 beds (children's 71 and venereal diseases 15); 72 additional beds are retained at local convalescent homes for the reception of pre-convalescent cases. A rebuilding scheme has been carried out and is still being developed, providing modern operating theatres, three new wings, a self-contained out-patients' department, pathological laboratories and post-mortem rooms, and special departments. The Children's Hospital was reconstructed and enlarged, and a Nurses' Home is now in process of enlargement to accommodate 220 at a cost of £55,000. There are 13 resident salaried medical officers—viz., four house surgeons, two casualty officers, three house physicians, three anæsthetists, one dresser. The posts are filled half-yearly—April and October—and afford exceptional opportunities for post-graduate experience. Senior students are appointed as dressers and are given an honorarium (applications to the House Governor and Secretary). A post-graduate course of lectures is arranged annually by the Leicester Medical Society, and clinical classes are held for graduates preparing for M.D. and M.R.C.P.

Norfolk and Norwich Hospital

This hospital at Norwich has at present 392 beds. There is a convalescent home with accommodation for 35 patients at Cromer. The Resident Medical Staff consists of one House Physician, three House Surgeons, one House Surgeon to the Ear, Nose, Throat, and Eye Department, and one Casualty Officer. There is also a Private Patients' Home which has at present 20 beds. Students are admitted to the practice of the hospital for a fee of £5 5*s*. for six months. House Governor and Secretary: Mr. Frank Inch.

Northampton General Hospital

In 1926 a new isolation block of 30 beds was opened. The number of beds is 253. There is an up-to-date Pathological Laboratory; also X Ray and Therapeutic Department and V.D. Clinic. Two new operating theatres have been built, and a new ophthalmic in-patient department has recently been completed. Further particulars may be obtained from the Secretary-Superintendent.

Nottingham General Hospital

There are at this hospital 384 beds available for medical and surgical patients, and 70 beds are in the detached branch, known as "The Cedars" Branch of the General Hospital. The Resident Medical Staff consists of 2 House Physicians, 4 House Surgeons, 1 Aural House Surgeon, and 2 Casualty Officers. The special departments are the Ear, Nose, and Throat, Skin, Dental, Massage, X Ray, Deep X Ray Therapy, Orthopædic, Electrotherapeutic, Ultra-violet Light. House Governor and Secretary: Mr. P. M. MacColl.

Portsmouth Royal Hospital

The hospital contains 205 beds. There are Medical, Surgical, X Ray, Massage, Gynæcological, Orthopædic, and Urological Out-patients' Departments. Further particulars may be obtained from the Secretary.

Preston and County of Lancaster Queen Victoria Royal Infirmary

This is a General Hospital with 365 beds, including 72 at two Homes of Recovery. In addition to the Medical and Surgical Wards, there are special wards for Eye, Ear, Nose, and Throat conditions and Venereal Diseases, also a Maternity Department (recognised by the Central Midwives Board). The special departments include Bacteriological, Pathological, Biochemical, X Ray, including Superficial Deep Therapy, Electrocardiograph, Light (including Finsen installation), Electrotherapeutical, Ophthalmic, Aural, Orthopædic, Dental, Venereal Diseases (including daily intermediate treatment). Radium treatment is given at the hospital in conjunction with the Manchester Radium Institute. The Visiting Staff consists of 5 Surgeons (4 in consulting practice), 3 Physicians, 3 Radiologists, 2 Eye and Aural, 1 Pathologist, 3 Anæesthetists, 1 Medical Officer to Electrotherapeutic Department, and the Resident Staff—R.S.O., 3 House Surgeons, 1 Casualty Officer, 1 House Physician.

Royal Sussex County Hospital

This hospital at Brighton has 246 beds and affords ample facilities for students, possessing a large out-patient department, including Ophthalmic, Dental, Dermatological, Ear, Nose, and Throat, X Ray, and Electrotherapeutic sections, and a well-appointed clinical research and bacteriological department. The hospital does not take resident pupils, but out-pupils may attend the practice of the hospital for any period not exceeding two years, on payment in advance of a fee, not exceeding 20 guineas, as the Board of Management shall direct.

Salisbury General Infirmary

This hospital at Salisbury contains 161 beds. Maternity and Antenatal Ophthalmic Wards; and Ear, Nose, and Throat Wards; maternity and child welfare clinic.

Salop Royal Infirmary

This hospital at Shrewsbury has 156 beds. In-patients, 2019; out-patients, 1698; out-patients' attendances, 31,762; accidents and casualties, 6507; dental cases, 255. Secretary-Superintendent: J. W. Noble. The New Wing for the reception of Women and Children is capable of accommodating some 40 patients.

South Hants and Southampton Royal Hospital

This hospital at Southampton contains 275 beds with every facility for clinical instruction. Special Departments: Ear, Nose, and Throat, Ophthalmic, Dermatological, Electrocardiograph, X Ray, Massage and Electricity, Ultra-violet Ray. Large Out-patient Department. Radium Department (Regional Radium Centre). Pathological Institute.

Staffordshire General Infirmary

This hospital was established at Stafford in 1766, and has over 100 beds. It is a Training School for Nurses. Paying patients are accepted.

Staffordshire (North) Royal Infirmary

The New Infirmary opened in 1869 at Hartshill, Stoke-on-Trent, built on the pavilion plan, has accommodation for 356 patients, including Children's wards. The Infirmary is a Regional Radium Centre (National Radium Commission), and has the following departments: Bacteriological, Pathological, Biochemical, Ophthalmic, X Ray, Electrotherapeutical (including Ultra-violet Ray Lamps), Electrocardiograph, Aural, Orthopædic, Dental, and Venereal Diseases Clinics, including daily Intermediate Treatments. Recent extensions comprise a new ward block, new X Ray and Orthopædic Departments, with connecting corridors to the existing Infirmary, large extensions to the nurses' home, new boiler house, new chimney stack, new laundry, new surgery and casualty department, and a new pay beds department. Secretary and House Governor: Mr. W. Stevenson.

West of England Eye Infirmary

Students of the Exeter hospital can attend the practice of the Eye Infirmary (64 beds). A ward is set aside for newly born babies suffering from infectious eye diseases. Mothers with babies are accommodated. A new Fusion Treatment Department has been added.

Wolverhampton—the Royal Hospital

There are 290 beds. Special Departments: Children, Gynæcology, Maternity, Ear, Throat, and Nose Diseases, Electrotherapeutic and X Rays, Orthopædics, Artificial Sunlight, Venereal Disease, Pathological and Biochemical Laboratories, Dentistry, Radium, Skin Diseases, Psychiatric Clinic, and Electrocardiograph. There is an excellent medical library. The Resident Staff consists of Resident Assistant Surgeon, Resident Assistant Pathologist, one House Physician, and four House Surgeons. Women's Department, one Resident Maternity Officer and one House Surgeon. Pupils are allowed to witness the whole of the practice of the hospital, and to be present at operations, and have every opportunity of acquiring a practical knowledge of their profession. The hospital is recognised by the various Examining Bodies for a part of the requisite attendance on Medical and Surgical Practice. A course of Practical Pharmacy is given by the Pharmacist. Fees on application. Applications should be made to the Honorary Secretary of the Medical Committee.

Worcester Royal Infirmary

The hospital has 142 beds. An obstetric department and side wards to be opened this year will increase the accommodation by 16 beds. Last year a new wing was added consisting of two operating theatres and a complementary suite of rooms, an Orthopædic and Electro-massage Department, a Pathological Laboratory, and Ear, Nose, and Throat Ward, a Mortuary, Post-mortem Room, Viewing Chapel, and Inquest Room. A new Nurses' Home was also opened last year, providing accommodation for Matron, 10 Sisters, and 50 Nurses. The Resident Medical Staff has been increased to three, and a house in the Infirmary grounds has been furnished and equipped for them. All hot water and steam services are run on oil fuel. There is a Department for Venereal Diseases, and Surgical Tuberculosis cases are treated. There is also a Mental Out-patient Clinic.

York County Hospital

This hospital at York contains 197 beds. There are balconies for outdoor treatment, X Ray Department, Orthopædic, Dental, Electrotherapeutic and Massage Departments, actinotherapy installation, and clinical laboratories. There are clinics for Functional Nervous Disorders, Venereal Diseases, and Electrocardiography.

MEDICAL EXAMINING BODIES AND SCHOOLS IN SCOTLAND

UNIVERSITY OF ABERDEEN

The University of Aberdeen grants four degrees in Medicine and Surgery—viz., *M.D.*, *Ch.M.*, *M.B.*, and *Ch.B.* The Degree of Doctor of Philosophy (*Ph.D.*) is also granted in the Faculty of Medicine.

Degrees of M.B. and Ch.B.—Candidates, before entering on the curriculum, must have passed the Preliminary Examination or hold a qualification recognised as exempting from such examination.

The curriculum for the degrees extends over a period of five years, during which attendance is required in the following subjects: Biology, Physics, Chemistry (Systematic and Practical), Anatomy (Systematic and Practical), Physiology (Systematic and Practical), Materia Medica and Therapeutics, Practical Pharmacy, Pathology (Systematic and Practical), Forensic Medicine, Public Health, Surgery, Medicine, and Midwifery.

Candidates must attend for at least three years the medical and surgical practice of a recognised hospital, they must have attended courses of at least nine months in clinical medicine and clinical surgery, and have acted as clerk in the medical and dresser in the surgical wards of a hospital. Attendance is required on the practice of a dispensary or the out-practice of a hospital and also on courses in Mental Diseases, Fevers, Ophthalmology, Post-mortem Examinations, Venereal Diseases, Tuberculosis, Radiology, X Ray Therapeutics and Electrical Treatment, and Clinical Chemistry, and other special subjects. The candidate is also required to have been properly instructed in Vaccination and to have attended at least 20 Midwifery cases.

Degrees of M.D. and Ch.M.—Candidates for either of these degrees must already hold the degrees of M.B. and Ch.B. of Aberdeen. A Thesis (in duplicate) has to be presented and an examination has to be passed in Clinical Medicine (or in some special Department of Medical Science) or Clinical Surgery, as the case may be.

Degree of Ph.D.—For this degree candidates must pursue a course of special study or research during a period of nine academical terms as Research Students in the University of Aberdeen or in any College or Institution that may be affiliated thereto. A Thesis (in duplicate) must be presented for approval.

A Diploma in Public Health is granted by the University to graduates in Medicine of a University in the United Kingdom, after a special examination.

Scholarships and Prizes.—In the Faculty of Medicine of the University of Aberdeen there are the following Bursaries, Scholarships, and Prizes:—Bursaries: about 80 Bursaries (competition and presentation) ranging in value from £30 to £50 per annum, most of them being tenable from three to five years. Scholarships: five Post-graduate Scholarships, ranging in value up to £250 per annum. Prizes and Medals: 16 Gold Medals and Prizes for proficiency in special departments.

Clinical Studies are carried on mainly at the Aberdeen Royal Infirmary. There are 366 beds. The main clinical work of the students is done in the infirmary with its general and special facilities, including a department of clinical chemistry. A dietetic department has recently been established under the direction of a qualified Dietitian. A post-graduate course in medicine is given during the summer term.

The Aberdeen Royal Mental Hospital contains about 900 beds, and a class of mental diseases meets at the University of Aberdeen, and clinical instruction is given at the hospital during three months in summer. Wellwood Nursing Home, Pitfodels, Cults, Aberdeenshire, for the treatment of early cases of nervous and mental disorders, has 20 beds.

Students have the opportunity of attending the following institutions: City Fever Hospital, Sick Children's Hospital, General Dispensary, Lying-in and Vaccine Institutions, and the Ophthalmic Institution.

UNIVERSITY OF EDINBURGH

Four Degrees in Medicine and Surgery are conferred by the University of Edinburgh—viz., *M.B.*, *Ch.B.*, *M.D.*, and *Ch.M.* The degree of *Ch.B.* shall not be conferred on any person who does not at the same time obtain the degree of *M.B.*, and the degree of *M.B.* shall not be conferred on any person who does not at the same time obtain the degree of *Ch.B.* No one is admitted to the degrees who has not been engaged in study for five years.

Candidates for the degrees of M.B. and Ch.B. must have attended for at least three academic years the medical and surgical practice either of the Royal Infirmary, Edinburgh, or of a general hospital elsewhere which accommodates not fewer than 80 patients and possesses a distinct staff of physicians and surgeons. They must have attended courses of instruction in Clinical Surgery and Clinical Medicine each of nine months, and courses of instruction in all the subsidiary subjects. They must have attended a course in Clinical and Practical Midwifery and have personally conducted 12 cases.

With respect to the places and institutions at which the studies of the candidates may be prosecuted the following regulations have effect: Three of the five years of medical study must be spent in the University of Edinburgh. The remaining two years may be spent in any University of the United Kingdom, or in any Indian, Colonial, or Foreign University or medical school recognised for the purpose by the University Court. Women are admitted to graduation in medicine under the same conditions as men.

Bachelors of Medicine and *Bachelors of Surgery* may proceed to the degrees of *Doctor of Medicine* and *Master of Surgery* after they have spent one year in the medical or surgical wards respectively of a hospital, or the Military or Naval Medical Services, or in scientific work bearing directly on their profession, or two years in practice. In each case an examination must be passed and a thesis submitted.

Clinical instruction is carried on mainly at the Edinburgh Royal Infirmary. At this institution there are 1011 beds, including 42 cots for children. The clinical work of the Edinburgh student is done at the Royal Infirmary. Courses of Clinical Medicine and Surgery are given by the physicians and surgeons to male and female students. Special instruction is given on Diseases of Women, Physical Diagnosis, Diseases of the Skin, Diseases of the Eye, the Ear, the Larynx, and the Teeth. Separate wards are devoted to Venereal Diseases, Diseases of Women, Diseases of the Eye, the Ear, Throat and Nose, and the Skin, and also to cases of Incidental Delirium or Insanity. There is also a large and complete Radiological Department in which is given theoretical and practical instruction for the University Diploma in Radiology, &c. In addition to the Out-patient Departments connected with the Surgical and Medical Houses, there are separate Out-patient rooms attached to the Special Departments. Post-mortem examinations are conducted in the anatomical theatre by the pathologist and his assistants, who also give practical instruction in Pathological Anatomy and Histology.

The appointments are: 1. Resident physicians and surgeons are appointed and live in the house free of charge. The appointment is for six months, but may be renewed at the end of that period by special recommendation. 2. Non-resident house physicians and surgeons and clinical assistants are appointed for six months. The appointment may be renewed for a like period by special recommendation. 3. Clerks and dressers are appointed by the physicians and surgeons. These appointments are open to all students and junior practitioners holding hospital tickets. 4. Assistants in the Pathological Department.

Among other hospitals where the students obtain clinical instruction are the Royal Hospital for

SICK CHILDREN and the EDINBURGH EYE, EAR, AND THROAT INFIRMARY. The Hospital for Sick Children at Sciennes-road, Edinburgh, has 132 beds, fitted with every modern improvement. A fully equipped out-patient department (medical and surgical) is conducted daily. Systematic courses of instruction, which qualify for graduation in the Edinburgh University and elsewhere, are given thrice throughout the year by the staff. Each course consists of 50 meetings and combines medicine and surgery. Post-graduate Courses of Lectures are held during the summer vacation.

At the EDINBURGH EYE, EAR, AND THROAT INFIRMARY (with which is incorporated the Edinburgh Eye Dispensary) clinical lectures and instruction are given daily (except Mondays). Practical Ophthalmoscopic Classes are arranged, and Clinical Assistants are appointed from time to time. A Post-graduate Course in Diseases of the Ear, Nose, and Throat is held each academic term, commencing in May, October, and January, and continuing for six weeks.

Post-graduate Instruction.—In the departments of the Faculty of Medicine provision is made for research by students of graduate standing. In the University laboratories facilities will be provided for approved candidates for the Degree of Ph.D.

In connexion with the University and Royal Colleges Post-graduate Instruction is given each year, chiefly in the Summer Vacation (July-September). Special Courses are arranged for, and particulars may be had on application to the Hon. Secretary, Post-graduate Courses in Medicine.

The University of Edinburgh is especially rich in scholarships and prizes in medical subjects. Full particulars concerning these, as well as concerning the fees at different stages, can be obtained from the Dean of the Medical Faculty.

UNIVERSITY OF GLASGOW

The University of Glasgow is both a teaching and a degree-granting body, but admits to graduation only candidates whose preliminary examination and course of study conform to its own regulations. Within certain limits instruction given by recognised medical schools and teachers may be accepted, but not less than one-half of the subjects other than clinical must be taken in this or some other recognised university, and at least two years of the course must be taken in Glasgow University. Seven degrees, open both to men and women, are conferred: *M.B.* and *Ch.B.* (always conjointly), *M.D.* and *Ch.M.*; *B.Sc.* in Public Health; *D.Sc.* in Public Health; *B.Sc.* in Pharmacy; and *Ph.D.* in the Faculty of Medicine. A Diploma in Public Health (*D.P.H.*) is also granted.

All information as regards the extent and standard of the Preliminary Examination may be obtained by application to the Secretary, Scottish Universities Entrance Board, 81, North-street, St. Andrews.

For the degrees of M.B. and Ch.B. a curriculum of five years is required. The candidate must attend a course or courses of instruction in each of the following subjects of study, extending over not less than the number of terms specified in each case, and including such class examinations as may be prescribed in connexion with the several courses: Chemistry (including Organic Chemistry), with Practical Chemistry, three terms; Physics (with practical work), one term; Botany (with practical work), one term; Zoology (with practical work), one term; Anatomy and Practical Anatomy, five terms; Physiology and Practical Physiology, three terms; Materia Medica and Therapeutics (together or separately), each subject, one term; Pathology and Practical Pathology, three terms; Medical Jurisprudence and Public Health (together or separately), each subject, one term; Midwifery and Diseases peculiar to Women and to Infants, two terms; Surgery, two terms; Medicine, two terms. Candidates must attend for at least three years the Medical and Surgical Practice of a recognised hospital accommodating at least 80 patients and having a distinct staff of physicians and surgeons. At least nine months' hospital attendance is required on both Clinical Surgery and Clinical Medicine with nine months more of general hospital practice; the student must have acted for six months as clerk in medical and dresser in surgical wards, and must have had six months' outdoor practice; he must also have attended a course of Mental Diseases and of Practical Pharmacy (25 meetings), must have been properly instructed in Vaccination at a public vaccination station, and must have attended at least 20 cases of labour and the Practice of a Lying-in Hospital. The University also requires further study in various special subjects: Ophthalmology, Diseases of the Ear, Throat and Nose, Venereal Diseases, Tuberculosis, Fevers, Vaccination. The final year consists of three intensive terms of study: one devoted to Midwifery and Diseases of Women, one to Surgery, and one to Medicine.

There are four Professional Examinations, the first comprising Botany, Zoology, Physics, and Chemistry; the second comprising Anatomy and Physiology; the third comprising Materia Medica and Therapeutics and Pathology; and the fourth or final, comprising Medical Jurisprudence and Public Health, Surgery and Clinical Surgery, Practice of Medicine and Clinical Medicine, and Midwifery and the Diseases peculiar to Women and to Infants.

The degrees of M.D. (Doctor of Medicine) and Ch.M. (Master of Surgery) are granted to candidates, not under 24 years of age, who have previously obtained the double bachelorship, on completing examinations in Clinical Medicine for M.D., and in Surgical Anatomy, operations on the dead body, and Clinical Surgery for Ch.M. The higher degree of Doctor of Philosophy (Ph.D.) is also conferred in the Faculty of Medicine. Candidates must already have obtained a degree (or equivalent diploma) from an approved University or College, and must prosecute a course of special study or research for two or three years and give evidence of satisfactory progress. A thesis must be presented for approval by the Senate on the recommendation of a Special Committee. The candidate may be required to undergo an oral or other examination on the subject matter of the thesis.

Post-graduate Medical Teaching is available under the auspices of Glasgow Post-Graduate Medical Association, which is representative of practically all the Teaching Institutions in Glasgow. Weekly demonstrations for practitioners are given throughout the winter and spring, and comprehensive courses of instruction during the summer and autumn. There is a General Medical and Surgical Course during the last two weeks of August and the first two weeks of September. This is a whole-time course and includes most of the subjects of interest to the general practitioner. Arrangements have been made whereby a limited number of graduates may become attached to wards or out-patient departments nominally as clinical assistants for definite periods throughout the year.

There are many Bursaries, Scholarships, and Prizes in connexion with the Medical Course.

Clinical Studies are carried on mainly at the GLASGOW ROYAL INFIRMARY. The ancient connexion between the University of Glasgow and the Royal Infirmary was revived in 1911, when four University Chairs and several University Lectureships were established at the infirmary. These are as follows: Chairs: Medicine (Muirhead), Surgery (St. Mungo), Obstetrics and Gynæcology (Muirhead), Pathology (St. Mungo—Notman). Lectureships: Clinical Medicine, Clinical Surgery, Venereal Diseases, Laryngology, Rhinology, and Otology, Dermatology, Electrical Diagnosis and Therapeutics, Materia Medica and Therapeutics (Walton), Pathological Biochemistry, Pathology, Bacteriology. St. Mungo's College, which embraces and continues the original Royal Infirmary Medical School, is situated in the infirmary grounds. The infirmary has, including the Ophthalmic Department, over 800 beds. In addition to the large medical and surgical departments, there are special wards for diseases of women, of the throat, nose, and ear, skin, eye, burns, septic cases, biochemical investigation, and urology. The wards are open to women students. Six house physicians and 9 house surgeons, who each receive an honorarium on signing on for six months and board in the hospital free of charge, are appointed every six months; also 5 non-resident house physicians, 9 non-resident house surgeons, and 1 non-resident dental house surgeon. Clerks and dressers are appointed by the physicians and surgeons. As a large number of cases of acute diseases and accidents of a various character are received, these appointments are very valuable and desirable. There is a modern and fully equipped electrical pavilion and massage department, and school of massage, and year by year the latest and most approved apparatus for diagnosis and treatment has been added. Post-graduate classes are held during August and September in clinical medicine, surgery, and gynæcology, diseases of the skin, biochemistry, diseases of the throat, nose, and ear, and in diseases of the eye. Tutorial classes for senior students are also held in August and September. Post-graduate clinical assistantships are open to graduates all through the year.

The Glasgow Ophthalmic Institution is administered by the Royal Infirmary and clinical and systematic courses for students, under-graduate and post-graduate, are arranged there.

Other large centres for clinical instruction are the Western and the Victoria Infirmaries.

Glasgow Western Infirmary

This hospital of 650 beds adjoins the University. Special wards are set apart for diseases of women, throat, nose, and ear, and for affections of the skin. In the out-patient department there are special clinics for diseases of women and for diseases of the throat, ear, nose, teeth, skin, venereal disease, and electro-therapeutics. This is the radium centre for Glasgow and the West of Scotland. The clinical courses are given by the physicians and surgeons, each of whom conducts a separate class, and students require to enter their names at the beginning of the session for the class which they propose to attend. Special instruction is given to junior students by tutors or assistants, and clinical clerks and dressers are selected from the members of the class. In the pathological and bacteriological departments the courses are both systematic and practical, and extend through the winter and following summer; these are likewise recognised by the University for graduation. In addition post-graduate courses are held. Eighteen resident assistants are appointed annually from those who have completed their course. In the Clinical Laboratory students receive laboratory instruction from the lecturer on clinical methods.

Victoria Infirmary

This institution, situated at Langside, and having its office at 40, St. Vincent-place, Glasgow, has 427 beds, and is the third of the extensive general hospitals in Glasgow to afford opportunity for clinical instruction to students. In addition to a full general staff there is a clinical research laboratory with pathologists and bacteriologists attached; radiological instructor, and a full assortment of specialists. The Bellahouston Dispensary, also with a clinical staff, is conducted in connexion with the Victoria Infirmary. A new wing for paying patients was opened a year ago, containing 32 beds.

Glasgow is particularly well provided with institutions where clinical training can be obtained, and the following centres may be mentioned.

Royal Hospital for Sick Children, Glasgow

This institution consists of: (1) a hospital at Yorkhill containing 275 cots, built on an elevated and central site close to the University; (2) an out-patient department in West Graham-street; and (3) a country branch at Drumchapel, Dumbartonshire, containing 80 cots. There are one professorship and four lectureships in the University of Glasgow, in connexion with the hospital, one professorship and one lectureship on the medical diseases of infancy and childhood, one lectureship on surgery and orthopædics in relation to infancy and childhood, one lectureship on biochemistry in relation to infancy and childhood, and one research lectureship on the pathology of the diseases of infancy and childhood. The lectures are both systematic and clinical, but particularly and chiefly the latter. In addition, special facilities are given for post-graduate study. Resident house physicians and surgeons are appointed every six months, in April and October.

Glasgow Royal Maternity and Women's Hospital

The average number of patients in the hospital at Rottenrow is 164. There are also over 4000 mothers attended per annum in their own homes. The work of the antenatal wards with their 50 beds is supplemented by large antenatal clinics where over 5000 new patients are seen in the course of the year. Well-equipped research laboratories were opened in 1926. A pædiatrician gives daily attendance and the practice of the hospital affords a good field for post-graduate study.

Glasgow Royal Samaritan Hospital for Women

The hospital has 160 beds and offers excellent facilities for clinical instruction in the diseases peculiar to women. Lectures and clinical demonstrations are given by members of the surgical staff to students and to post-graduates; and the hospital is represented on the Board of the Glasgow Post-Graduate Medical Association formed for coördinating post-graduate medical teaching in all the hospitals. The Royal Samaritan Lectureship in Gynæcology is a University lectureship associated with the hospital.

Glasgow Lock Hospital

The hospital at 41, Rottenrow, Glasgow, contains 84 beds for the treatment of females suffering from Venereal Diseases. There is also a Labour Ward, and a well-equipped Dispensary for out-patient attendances. There is a bacteriological laboratory, equipped with modern appliances, where continuous research work is done. Large University classes are held on the subject of female venereal disease. Post-graduate classes are also held. Recently the hospital has been completely renovated and modernised.

Glasgow Eye Infirmary

The wards and dispensary at Berkeley-street and Charlotte-street are recognised by the University for the purpose of instruction in ophthalmology for graduation in medicine at the University. A venereal centre has been established, and a branch dispensary has been opened in Clydebank. Post-graduate classes are held.

Glasgow Ear, Nose and Throat Hospital

The hospital contains 57 beds. At out-patient and indoor departments at 306, St. Vincent-street, clinical instruction is given. A research department has been installed, and post-graduate courses are held during the year.

Anderson College of Medicine

Courses are given at Dumbarton-road, Glasgow, W., which qualify for all the licensing boards and for the Universities of Oxford, Cambridge, London, Durham, Edinburgh, and Glasgow (the latter two under certain conditions). Extensive accommodation is provided for practical anatomy, chemistry, botany, zoology, physiology, pharmacy, and operative surgery. Women students are admitted on the same terms as men, and the Carnegie Trust extends its benefactions to students of the College. Candidates for the L.D.S. can obtain the full medical curriculum; the courses special to dentistry are conducted at the Dental Hospital, Glasgow.

Communications relating to the College to be addressed to the Secretary of the Medical Faculty. Communications relating to the Preliminary Examination in General Education to be addressed to the Educational Institute Office, 47, Moray-place, Edinburgh; and relating to the Triple Qualification and to the Dental Qualification to be addressed to Royal Faculty Hall, 242, St. Vincent-street, Glasgow.

Queen Margaret College

Queen Margaret College (Women's Department of the University) is an integral part of the University of Glasgow. The classes are taught by professors of the University and other lecturers appointed by the University Court, and it is governed by the University Court and Senate. The curricula, regulations, and fees are the same as those of the male students, and the University degrees are open to women on the same conditions as to men. The school of medicine is a special feature of the College, and gives full preparation for the medical degrees of the University. The women students attend classes in the various University Buildings at Gilmorehill and Queen Margaret College, the Royal Infirmary, the Western Infirmary, and the Victoria Infirmary. Facilities for clinical work are given in the Royal, Western, and Victoria Infirmaries, in the Maternity, Royal Sick Children's, and other hospitals. The Arthur Scholarship is open every third year to students of first year; other Bursaries are open in Arts and Medicine, and women are admitted to certain University bursaries and fellowships.

St. Mungo's College

The classes in St. Mungo's College (vide Glasgow Royal Infirmary) qualify for the medical and dental qualifications of the English, Scotch, and Irish Conjoint Boards, and, under certain conditions, for the various universities, including the University of London. Students who have fulfilled the conditions of the Carnegie Trust are eligible for the benefits of this Trust during the whole course of their studies at St. Mungo's College. Further particulars can be obtained from the Secretary of the Medical Faculty.

UNIVERSITY OF ST. ANDREWS

Four Degrees in Medicine and Surgery are conferred by the University of St. Andrews (United College, St. Andrews and University College, Dundee)—viz., *M.B.*, *Ch.B.*, *M.D.*. *Ch.M.*, a Diploma in Public Health, Diploma in Dental Surgery (*L.D.S.*), and a Diploma in Public Dentistry (*D.P.D.*).

The extent and standard of the *Preliminary* Examination is determined by the Scottish Universities Entrance Board, constituted under Ordinance No. 70 of the Scottish University Courts (General No. 3—Regulations as to Admission to the Scottish Universities for purposes of graduation), in accordance with the terms of that Ordinance. A degree in Arts or in Science in any of the Universities of the United Kingdom and in some colonial and foreign universities exempts. The Preliminary Examination for graduation in Medicine and Surgery, Arts or Science, of the University of St. Andrews is accepted as equivalent to the Registration Examination required by the General Medical Council (*the certificate* to include the required subjects). Also the Final Examination for a degree in Arts or Science.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—Candidates must have been engaged in medical study for at least five years. In each of the first four years the candidate must have attended at least two courses of instruction in one or more of the subjects of study specified below, each course extending over a session of not less than five months, either continuous or divided into two terms, or alternatively, one such course along with two courses, each extending over a session of not less than two and a half months. During the fifth or final year the candidate shall be engaged in clinical study for at least nine months at the Infirmary of Dundee or at one or more of such public hospitals or dispensaries, British or foreign, as may be recognised for the purpose by the University Court. The candidate must have received instruction in each of the following subjects of study, including such examinations as may be prescribed in the various classes—viz., Anatomy, *Practical* Anatomy, Chemistry, Materia Medica, Physiology, Practice of Medicine, Surgery, Midwifery, and the Diseases peculiar to Women and Infants, Pathology, Bacteriology, Practical Chemistry, Physics, Elementary *Botany*, *Elementary Zoology*, Practical Physiology, Practical Pathology, Forensic Medicine, and Public Health. The candidate must have attended for at least three years the Medical and Surgical Practice either of the Infirmary of Dundee or of a General Hospital elsewhere with not fewer than 80 patients, with a distinct staff of physicians and surgeons, and recognised for the purpose by the University Court. Additional subjects of study are Practical Pharmacy, Mental Diseases, Practical Midwifery, Operative Surgery, Vaccination, Children's Diseases, Fevers, Ophthalmology, Diseases of the Ear, Throat, and Nose, Anæsthetics, Dermatology, Venereal *Diseases*, Tuberculosis, and Post-mortem Examinations.

With respect to the places and institutions at which the studies of the candidate may be prosecuted the following regulations shall have effect: 1. Two of the five years of medical study must be spent in the University of St. Andrews. 2. The remaining three years may be spent in any University of the United Kingdom or in any Indian, Colonial, or Foreign University recognised for the purpose by the University Court, or in such medical schools or under such teachers as may be recognised for the purpose by the University Court. Women are admitted to graduation in Medicine.

Professional Examinations for the Degrees of Bachelor of Medicine and Bachelor of Surgery.—Each candidate will be examined both in writing and orally, and also clinically where the nature of the subject admits, in the following divisions—viz., first, in Botany, Zoology, Physics, and Chemistry; second, in Anatomy and Physiology; third, in Materia Medica, Pathology and Bacteriology, Forensic Medicine and Public Health; and fourth, in Surgery, Clinical and Operative Surgery, Practice of Medicine and Clinical Medicine, and Midwifery and Gynæcology (Systematic and Clinical).

University College, Dundee

The Medical School in St. Andrews University is carried on as follows. Part or whole of the medical *curriculum of St. Andrews University* must be taken here. Provision is made by St. Andrews University for instruction in the work of the first two years, including Anatomy and Physiology, in both St. Andrews and Dundee. The last three years of the curriculum must be taken in Dundee in the medical school.

Post-graduate courses are given in connexion with the Dundee Royal Infirmary during the spring and summer months.

Dundee Royal Infirmary

This institution has 450 beds. In addition to the *ordinary* Medical and Surgical Wards, there are *special* departments for Midwifery (In- and Out-door), for Diseases of Women, of Children, of the Eye, of the Ear, Nose, and Throat, and of the Skin; and for Pathology, Radiology, Electrotherapeusis, and Electrocardiography. The Pathological Department has recently been reconstructed and enlarged. Clinical teaching is given to students by the Honorary Staff; post-mortem examinations are conducted by the Pathologist. All courses of instruction are recognised by the University of St. Andrews and the other Universities and Boards of the United Kingdom. Ten Resident Medical Officers are appointed every six months. Clinical clerks and dressers are attached to the Physicians and Surgeons, and Students are appointed as assistants in the pathological department. Post-graduate classes are held in May and June. Further information may be obtained from the Medical Superintendent.

SCOTTISH MEDICAL CORPORATIONS GRANTING DIPLOMAS

CONJOINT EXAMINING BOARD

The Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow have made arrangements by which, after one series of examinations, held in Edinburgh or Glasgow, or both, the student may obtain the diplomas of the three bodies. This is the Scottish Conjoint Board. The three bodies grant their Single Licences only to candidates who already possess legal qualifications in Medicine or Surgery.

The hospitals which are recognised by the Scottish Conjoint Board as places where professional study for their diplomas can be pursued are all those institutions which feed the medical faculties of the universities, as well as all the places which are recognised by the English and Irish Conjoint Boards.

Professional Education.—The candidate must produce certificates or other satisfactory evidence of having attended the following separate and distinct courses of instruction: Physics, 1 term; Elementary Biology, 2 terms; Elementary Inorganic and Organic Chemistry, 2 terms; Anatomy Lectures, 2 terms; Practical Anatomy, 5 terms; Physiology Lectures, 2 terms; Practical Physiology (including Histology, Biochemistry, and Biophysics), 3 terms; Materia Medica, 2 terms; Pathology (including Practical Pathology), 3 terms; Practice of Medicine, 2 terms; Clinical Medicine, 3 terms; Principles and Practice of Surgery, 2 terms; Clinical Surgery, 3 terms; Midwifery and Gynæcology, 2 terms; Diseases of Children, 1 term; Medical Jurisprudence, 1 term; and Public Health, 1 term. The certified attendance on lectures, demonstrations, and practical work must not be less than three-fourths of the total number of roll-calls. Every student undergoes a course of Practical Midwifery, but before attending at labours he is required to attend a course of lectures on Surgery and Midwifery and to hold the offices of Clinical Medical Clerk and Surgical Dresser. He must also attend for two and a half months' instruction in Practical Pharmacy; the certificate to be signed by the teacher, who must be a member of the Pharmaceutical Society of Great Britain, or the superintendent of the laboratory of a public hospital or dispensary, or a registered practitioner who dispenses medicines to his patients, or a teacher of Practical Pharmacy.

The student must attend for 27 months the Medical and Surgical practice of a public general hospital containing on an average at least 80 patients available for clinical instruction and possessing distinct staffs of physicians and of surgeons. He must act as Surgical Dresser and Medical Clinical Clerk for not less than nine months in the wards in each case, and receive practical instruction in administration of anæsthetics. He must attend for three months the practice of a public dispensary especially recognised by any of the above authorities, and three months' attendance at the out-patient department of a recognised general hospital. This attendance should be made after the student has passed the First and Second Examinations.

Candidates are also required to attend the following three-monthly courses: Diseases and Injuries of the Eye; Insanity; Infectious Diseases, Gynæcology; Tuberculosis; Diseases of the Skin; Diseases of the Ear, Nose and Throat; Radiology; Orthopædics; Diseases of Children. The curriculum lasts for five years, the fifth year being devoted to clinical work.

There are four professional examinations:—

First Examination includes Systematic and Practical Biology, Chemistry, and Physics.

The Second Examination must be Written, Practical, and Oral, and consist of the following subjects: (1) Anatomy and Embryology, and (2) Physiology, including Histology (if not included in Anatomy), Biochemistry, and Biophysics. Candidates may be admitted to this Examination on production of the necessary certificates of curriculum.

The *Third Examination* must be Written, Practical, and Oral, and consist of the following subjects: (1) Pathology, including Bacteriology and Morbid Anatomy, and (2) Pharmacology (Theoretical and Practical), including Pharmacological Chemistry, the Principles of Therapeutics, and Prescription Writing. Candidates may be admitted to this Examination on production of the necessary certificates of curriculum.

The *Final Examination* must consist of the following subjects [1]: (1) Medicine, including Therapeutics, Applied Anatomy and Physiology, and Clinical Pathology with Practical Medicine; (2) Surgery, including applied Anatomy and Physiology, Clinical Pathology, with Practical Surgery; (3) Midwifery and Diseases of Women, Clinical Obstetrics and Gynæcology, with Practical Midwifery; and (4) Medical Jurisprudence and Public Health. Medicine, Surgery, and Midwifery must be taken together, and Medical Jurisprudence and Public Health, and not earlier than on the conclusion of five Winters and five Summers of Medical Study, provided that a period of 33 months has elapsed since passing the Second Professional Examination. The Schedule for the Final Examination must contain a summary of the entire Course of Study, and, properly attested or proved by Certificates, must be lodged with the Inspector, and the fee paid, not later than two weeks before the examination. At the same time there must be produced a Certificate to show that the Candidate is not less than 21 years of age. No Candidate can be exempted from examination on any subject of the Final Examination (with the exception of Medical Jurisprudence and Public Health) unless he has already passed in the subject at this Board.

In addition to the Written and Oral Examinations all Candidates must be subjected to Clinical Examinations in Medicine, Surgery, and Midwifery and Gynæcology, which shall include the Examination of Patients, Physical Diagnosis, the Clinical use of the Microscope and of other instruments, Clinical Chemistry, Surgical Appliances, Bandaging, Surface markings, Skiagrams, &c. The Oral Examination includes the recognition of specimens. All Candidates for the Final Examination must complete the three portions (Medicine, Surgery, and Midwifery) within a period of 19 months.

There are four periods of examination annually.

The Registrar in Edinburgh is Mr. David Thomson, 49, George-square; and the Registrar in Glasgow, Mr. David Willox, 242, St. Vincent-street, to whom fees and certificates must be sent for the respective examinations, and from whom particulars of fees can be obtained.

School of Medicine of the Royal Colleges, Edinburgh

The Lectures in this School qualify for graduation at Edinburgh and other Universities, for the Examinations of the Conjoint Boards of Edinburgh and Glasgow, London, and Dublin. The number of students attending varies from year to year, and for the past few years the average number has been about 600. In accordance with the Regulations of the University of Edinburgh one-half of the qualifying classes required for graduation there may be attended in this School, the fees paid for such classes being the same as those for the corresponding University classes. Special classes of instruction for Dental students are included in the curriculum. Post-graduate courses are conducted in conjunction with the University. Further particulars regarding the School, also its calendar (price 9*d.*, including postage), may be had on application to the Dean of the School, Surgeons Hall, Edinburgh.

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[1] Candidates at the Final Examination may be examined on Diseases of Children, Fevers, Tuberculosis, Insanity, Skin Diseases, Diseases and Injuries of the Eye, Diseases of the Ear, Throat, and Nose, Radiology, Venereal Diseases, Orthopædics, Vaccination, and Anæsthetics.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

In addition to the Diplomas granted by the Scottish Conjoint Board, the Royal College of Physicians grants its Single Licence to candidates whose names are already on the Medical Register.

The Royal College of Physicians of Edinburgh grants a *Membership* and a *Fellowship*.

Membership.—A candidate, who must be a Licentiate of a British or Irish College of Physicians, or a graduate in medicine of a University, approved by the Council, and 24 years of age, is examined in medicine, therapeutics, and in any branch of the departments of medicine specially professed, such as general pathology, psychology, public health, obstetrics, gynæcology, diseases of children, tropical medicine, or medical jurisprudence.

Fellowship.—The Fellows are selected from the ranks of the *Members.*

ROYAL COLLEGE OF SURGEONS OF EDINBURGH

The Royal College of Surgeons of Edinburgh admits to the examination for its Single Licence any candidates who hold a Diploma in Medicine of any British, Indian, or Foreign university or of any British College of Physicians, or of the Society of Apothecaries of London or Apothecaries' Hall, Dublin, granted under the provisions of the Medical Act, 1886, whose preliminary examination and course of professional study is proved to be sufficient to fulfil the requirements of the College, or to those who have passed a full examination for any of the above. Female practitioners are admitted to the Licence of the College and also to the Fellowship, and the regulations apply to practitioners of either sex.

The College grants a diploma of Fellowship after examination to the holders of British surgical degrees or diplomas and the holders of recognised degrees of the Universities of Canada, Australia, and New Zealand.

The Fellowship.—Candidates must be 25 years of age and in practice for at least two years. The examination is written and viva voce, and includes surgery and surgical anatomy, operative surgery, and clinical practice. One optional subject must also be taken, the range of these specialisms covering nearly every branch of medicine. Candidates are not allowed to appear for more than three times at the examinations, unless by permission of the President's Council. Three weeks' notice of intention to appear for examination must be given by the candidate to the College.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

The Royal Faculty of Physicians and Surgeons of Glasgow grants a Fellowship and a Licence to be held separately. The Licence is granted as a separate qualification to qualified practitioners in Medicine after examination in surgery, including surgical anatomy and clinical surgery.

Fellowship.—The Fellowship of the Faculty is granted after examination in medicine or surgery, together with an optional subject, which may be anatomy or physiology, or be selected from any special branch of medicine or surgery. Fourteen days' notice must be given by the candidate to the Faculty. In certain circumstances Fellows may be elected as a mark of distinction. Address of Registrar: 242, St. Vincent-street, Glasgow.

MEDICAL EXAMINING BODIES AND SCHOOLS IN IRELAND

UNIVERSITY OF DUBLIN, TRINITY COLLEGE (SCHOOL OF PHYSIC)

Matriculation.—University students take the Entrance of Trinity College and a Junior Freshman Term or a special Medical Preliminary: Extern Students, any examination recognised by the General Medical Council.

Pre-registration Examination in Elementary Physics and Chemistry.—Before beginning the five years' Medical curriculum students must pass an examination in elementary Physics and Chemistry. This examination is held at the end of September, in January, in March, and in July. Courses in preparation for it may be taken in the School of Physic.

Degrees in Medicine (M.B.), Surgery (B.Ch.), and Midwifery (B.A.O.).—Candidates for these degrees must be of B.A. standing and must be for at least five academic years on the books of the Medical School, reckoned from the date of registration. The Arts course may be taken concurrently with the Medical course, and the B.A. degree need not be taken before the final medical examinations, but the Medical degrees are not conferred without the Arts degree. The following courses must be attended: (1) Botany, Zoology, Physics and Chemistry; Descriptive and Applied Anatomy; Histology, Physiology and Applied Physiology; Pathology and Bacteriology; Materia Medica and Therapeutics; Medical Jurisprudence and Hygiene; Practice of Medicine; Surgery; Midwifery and Gynæcology; (2) Three courses of nine months' attendance on the Clinical Lectures of Sir Patrick Dun's or other recognised Hospital; (3) Practical Vaccination, one month's instruction; (4) Mental Disease, three months; (5) Practical Midwifery with Clinical Lectures, including Antenatal and Infant Hygiene Clinics, also not less than 20 personally conducted cases, five months, one of which must be as a resident intern student; (6) Ophthalmic Surgery, three months. Three groups of examinations have to be passed. Preliminary Scientific Examination, including Physics and Chemistry, Botany, and Zoology. Intermediate Medical, Part I., including Anatomy and Physiology, Biochemistry and Histology; Part II., including Applied Anatomy and Applied Physiology; and the Final Examination, which is divided into Part I., Materia Medica and Therapeutics, Pathology and Bacteriology; and Part II., Medicine, including Clinical Medicine, Hygiene, Jurisprudence, and Mental Diseases; Surgery, including Operative and Ophthalmic Surgery; Midwifery and Gynæcology. Part I. may be passed in the fourth year, and Part II. completed at the end of the fifth.

Doctor in Medicine.—A Doctor in Medicine must have passed all the qualifying examinations and must be a B.A of three years' standing. He must also submit a thesis and pass an Examination before the Regius Professor of Physic.

Master in Surgery.—A Master in Surgery must be a Bachelor in Surgery of the University of Dublin of not less than three years' standing and must produce satisfactory evidence of having been engaged for not less than two years from the date of his registration in the study or study and practice of his profession. He must then pass a special examination.

Master in Obstetric Science.— A Master in Obstetric Science must be a Bachelor in Obstetric Science of two years' standing, and must produce evidence of having been engaged in the study or practice of Obstetric Medicine and Surgery during two years. He is then required to pass a special examination.

Diploma in Gynæcology and Obstetrics.—A post-graduate diploma is conferred upon registered medical practitioners who take a six months' course at the Rotunda Hospital or other recognised institution, a six months' course in Trinity College, and then pass a special examination. The minimum time required for the complete course is nine months.

Bachelor in Dental Science and Master in Dental Science.—The regulations under which these degrees are awarded can be obtained by application to the Registrar of the School of Physic.

All Degrees and Courses of Instruction are open to women students.

Scholarships and Prizes.—1. Medical and Surgical Travelling Prizes, £100, awarded in alternate years. 2. Bicentenary Memorial Prize, £30, awarded yearly, and given to the Travelling Prizeman. 3. Sir John Banks Prize and Medal. 4. Edward Hallaran Bennett Prize and Medal. 5. FitzPatrick Scholarship, awarded on results of Final Examination (interest on £1000). 6. Medical Scholarship, £20 per annum for two years, awarded in Chemistry, Physics, Botany, and Zoology. 7. Medical Scholarship in Anatomy and Physiology, £20 per annum for two years. 8. Henry Hutchinson Stewart Scholarships, one in Botany, Zoology, Chemistry, and Physics, and another in Anatomy and Physiology, awarded annually and valued at £10 per annum for three years. 9. Henry Hutchinson Stewart Scholarship in Mental Diseases, awarded from time to time, £50 per annum for three years. 10. John Mallet Purser Medal, awarded annually in Physiology. 11. Daniel John Cunningham Medal and Prize, awarded annually in Anatomy. 12. Begley Studentship, £40 per annum for four years, awarded annually. 13. Kingsmill Jones Memorial Prize, awarded annually in Natural and Experimental Science, £15. 14. O'Sullivan Memorial Scholarship, £48, awarded annually for excellency of record in school. 15. Adrian Stokes Memorial Fellowship, awarded every second year, the holder to carry out original work in Pathology and Bacteriology, about £320. 16. Aquilla Smith Prize, awarded annually in the Final Medical Examination, Part I., about £10. 17. Walter G. Smith Prize, awarded annually in Materia Medica and Therapeutics, about £10. 18. De Renzy Centenary Prize in Public Health, awarded annually, £15.

Post-graduate Instruction.—Arrangements have been made, with the approval of the Board of Trinity College, for a post-graduate course of instruction at the School of Physic during the autumn from Monday, Sept. 18th, to Saturday, Oct. 7th. Women graduates can be accommodated at Trinity Hall.

NATIONAL UNIVERSITY OF IRELAND

Matriculation.—All students must pass a matriculation examination; the examination taking place in June and September in Dublin, and at certain local centres, includes five subjects, three of which must be Irish, English, and mathematics. All students must pass in Irish except students not born in Ireland, and other students whose home residence shall have been outside Ireland during the three years immediately preceding their matriculation; but all such students will be expected to attend a course of instruction in Irish Literature and History prior to obtaining any degree in the University. The following are the subjects for examination: (1) Irish. (2) Latin. (3) Greek. (4) French. (5) German. (6) Italian. (7) Spanish. (8) Portuguese. (9) Welsh, or any other modern language approved by the Senate. (10) English. (11) Mathematics. (12) History. (13) Geography. (14) Applied Mathematics, or Physics as an alternative. (15) Chemistry. (16) Botany. (17) Agricultural Science. (18) Commerce. (19) Music, and for women candidates only (20) Physiology and Hygiene. Students entering for degrees in Medicine or Dentistry, if not already registered by the General Medical Council, must take Irish, Latin, English, Mathematics, and a fifth subject.

The medical degrees granted are:—

M.B., B.Ch., B.A.O.; M.D., M.Ch., M.A.O., Ph.D.—Printed forms of application for admission to any medical examination may be had from "The Registrar, The National University of Ireland, 49, Merrion-square, Dublin."

The Constituent Colleges of the National University of Ireland at which the full curriculum for medical degrees can be obtained are University College, Dublin; University College, Cork; and University College, Galway.

University College, Dublin

Matriculation.—Almost all the students of the College are matriculated students of the National University of Ireland. The pre-registration examination in physics and chemistry is taken after matriculation either at the beginning of or during the winter session. The course is of five years' duration and dates from the passing of the pre-registration examination.

Degrees of M.B., B.Ch., and B.A.O.—The First Examination includes Applied Physics, Applied Chemistry, Botany, Zoology, and Applied Biology. The examination may be taken in two parts: Part I., Physics and Chemistry; Part II., Botany and Zoology. Honours may be obtained only when both parts are taken as one examination. The Second Examination includes Anatomy and Physiology. Both must be passed at the same time. The Third Examination (Part I.) includes Pathology, Materia Medica, Pharmacology, and Therapeutics. Part II. (Third Examination), taken at the end of the Fourth Winter Session, includes Hygiene and Medical Jurisprudence.

The Final Examination in Medicine, Midwifery, Surgery, and Ophthalmology includes both the theoretical and the clinical branches. No student can enter for the M.B., B.Ch., or B.A.O. until the end of the fifth year after registration, when the curriculum has been completed. The degree of M.D. may be obtained either by examination or on published work.

A Post-graduate Summer Course is held each year, beginning about the middle of June. The D.P.H. Course extends over the year, beginning at the opening of the session.

University College, Cork

In the School of Medicine students must have passed the Matriculation Examination of the University or some other recognised examination, and a preliminary examination recognised by the General Medical Council.

Medical Students who have passed the First Professional Examination of the Conjoint Boards of Ireland, England, or Scotland may be admitted to the rank of second-year students on making application to the Council. Similarly, students who have passed the Second Professional Examination of the same Boards may be admitted to the rank of third-year students; and those who have passed the Third Professional Examination of the Dublin Colleges, or of the Edinburgh Colleges and Glasgow Faculties, may rank as fourth-year.

The school is provided with physiological, toxicological, pathological, and pharmaceutical laboratories, materia medica, anatomical, and pathological museums, as well as a collection of surgical and obstetrical instruments and appliances. There are dissecting-rooms, well-appointed physical, chemical, and biological laboratories, a large natural history museum in the adjoining building, and part of the College ground is laid out as a botanical garden. The plant houses are well filled with plants and are open to the students in the class of Botany. The Library contains about 70,000 volumes and is open daily during term time to students. The Medical Museum occupies a large room erected at the northern end of the medical buildings. There are Students' Clubs for men and women students of the College and various athletic clubs.

Residence of Students.—Students not living at home, or with relatives or friends, sanctioned by their parents or guardians, are required to live in a hostel or in recognised lodgings, and register their addresses each session. The Honan Hostel, adjoining the College, is equipped by private endowment. A number of sets of rooms, together with recreation and common rooms, are provided for lay students who may desire to live there. For full particulars apply to the Warden. The Ursuline Convent, Blackrock, has a house of residence, quite separate from their Secondary School, for Catholic women students. Candidates are prepared for D.P.H., Parts I. and II.

Clinical Instruction.—Students may attend the South Charitable Infirmary and County of Cork General Hospital, Cork North Charitable Infirmary and City of Cork General Hospital, the Mercy Hospital, the Cork District Lunatic Asylum, the Victoria Hospital for Diseases of Women and Children, the County Lying-in Hospital, Bon Secours, Fever, the District, and Ear, Eye, and Throat Hospitals.

Complete information with regard to class fees, scholarships, and prizes can be obtained from the Dean of the Medical Faculty, and in respect of the hospitals from the Secretaries.

University College, Galway

The College contains a well-lighted and ventilated dissecting room and an anatomical lecture theatre; physiological, pathological, pharmaceutical, chemical, and physical laboratories; anatomical, pathological, gynæcological, and materia medica museums; as well as large natural history and geological museums and an extensive library in which students can read and from which they can borrow books. In the School of Medicine there are 12 Entrance Scholarships, varying in value from £30 to £60 each, for which Medical Students compete with other students on the Entrance Course. In the Second, Third, and Fourth years three Scholarships in each year, value from £30 to £40 each, are reserved for Medical Students. H. H. Stewart Scholarships (£10 a year for three years) are awarded by the University in Anatomy and Physiology at Second Medical Examination amongst Students of the three constituent Colleges. Travelling Studentships (£200 a year for two years) are offered by the University for competition amongst Medical Graduates of the three Colleges of not more than two years' standing. Women students are eligible for all College and University Degrees, Distinctions, and Prizes. There are extensive grounds, a portion of which is occupied by a Botanic Garden and a portion is at the disposal of the College Athletic Union. There are several student societies in the College, including a Biological Society. There are abundant facilities for research and Post-graduate work in the Chemistry, Physiology, and Pathology departments. There are ample facilities for Women Students.

Clinical Instruction is given in the Galway Central Hospital and in the Galway Tuberculosis and Fever Hospitals. The CENTRAL HOSPITAL (300 beds) is completely renovated. In addition to the surgical and medical departments, there are now eye and ear, throat and nose, gynæcological and obstetrical, pathological, X Ray, electrical and massage departments. Medical and Surgical Clinics are held on alternate days during term. Two Resident Physicians and two Resident Surgeons are appointed every six months. Resident Students are admitted. The hospital is open to qualified medical men for post-graduate work.

HOSPITALS AFFORDING RECOGNISED PRACTICE [1]

The following hospitals afford practice recognised by the Irish Universities and Corporation.

Sir Patrick Dun's Hospital

Classes both in Medicine and Surgery are held each morning at Grand Canal-street, Dublin, from 9 o'clock from Oct. 1st till the end of June. Special classes for junior students will be held in the wards during the months of October, November, and December. A resident surgeon and resident physician, with salaries, are appointed annually. Six resident pupils are appointed every six months. Twelve surgical dressers and twelve clinical clerks are appointed each month. There are facilities for women students.

The practice of the hospital is open to all students, and the certificates are recognised by Dublin University, the National University, and Royal Colleges of Surgeons of England, Ireland, and Scotland. It is an official "Treatment Centre" for venereal diseases.

Prizes and Medals.—Clinical medals and prizes amounting to about £21 each will be awarded in medicine and in surgery respectively in accordance with the will of the late Rev. Samuel Haughton, M.D., S.F.T.C.D. Candidates who fail to obtain these medals and prizes will be awarded special certificates in medicine and surgery provided they show sufficient merit.

Adelaide Hospital

Two resident surgeons and four or more resident pupils are elected every six months.

Prizes.—The Hudson Scholarship, £30 and a Gold Medal, as well as the Hudson Prize, £10 and a Silver Medal, are awarded at the end of the session for proficiency in medicine, surgery, gynæcology, and pathology. In addition to this prizes are awarded in gynæcology and dermatology, and in clinical medicine and surgery for junior students. Wallace Beatty Memorial Bursaries are granted at the discretion of the Medical Board at the beginning of the Winter session. The certificates of attendance are recognised by all the Universities and licensing bodies in the United Kingdom.

Post-graduate work in the hospital is in conjunction with the course in Trinity College.

Mater Misericordiæ Hospital

This hospital, under the care of the Sisters of Mercy, containing 410 beds, is open at all hours for the reception of accidents and urgent cases. Clinical instruction is given by the staff. Ophthalmic surgery and surgery of the nose and throat are taught in the special wards and in the dispensary. Surgical operations are performed daily. Connected with the hospital are extensive dispensaries, which afford valuable opportunities for the study of general medical, dermatological, surgical diseases, and accidents; a fully equipped biochemical laboratory, a modern electro-massage department, an electrocardiograph room, and radiological department. Instruction is given on pathology and bacteriology. A special post-graduate course in connexion with the medical school of University College, Dublin, is held each June. Four house physicians, eight house surgeons, and 18 resident pupils are elected annually. Dressers and Clinical clerks are appointed regularly and certificates given for merit. Leonard Prizes will be offered for competition annually. Certificates of attendance are recognised by all the Universities and licensing bodies in the United Kingdom. There is a private hospital for the reception of medical and surgical cases. A training school and a home for trained nurses are connected with the hospital, and nurses who have passed a qualifying examination can be obtained on application to the Lady Superioress.

Entries can be made with any of the physicians or surgeons, or with the Registrar, 8, Fitzwilliam-place, Dublin.

Mercer's Hospital *

This hospital, situated in the centre of the city of Dublin, is in closest proximity to the Medical Schools, any of which can be reached on foot within five minutes, and from its position receives a large number of cases of emergency surgery in addition to the ordinary medical and surgical practice. Extensive alterations and reconstruction have brought the wards up to date. Additions have been made in the radiographical and electrocardiographic departments. Classes for pupils are held on alternate mornings in the medical and surgical wards. There is a large out-patient department available for the teaching of medicine, surgery, and gynæcology twice a week. Arrangements for clinical instruction are made with Cork-street Fever Hospital. A gold medal is awarded annually to the best pupil on the books of the hospital, and an annual prize of £85 has now been added.

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[1] This list of the institutions recognised by the Conjoint Board of Ireland is supplemented in the regulations of the Colleges by those hospitals mentioned as recognised institutions in Scotland and England. The recognised facilities for clinical instruction in some of the Irish centres have been described. The secretaries of the hospitals will always be ready to answer inquiries or to give additional information.

* No returns.

A house surgeon and house physician are appointed annually, and there is residential accommodation for six men and two women pupils. Clinical clerks and dressers are appointed from the classes.

Richmond, Whitworth, and Hardwicke Hospitals

These House of Industry hospitals, North Brunswick-street, Dublin, contain 325 beds—140 for surgical cases, 75 for medical cases, 78 for fever and other epidemic diseases, and an auxiliary wing with 32 beds, devoted mainly to throat, nose and ear, and skin diseases. Three resident physicians and three resident surgeons are appointed each half year. Resident clinical clerks are appointed each quarter, and it has always been the aim of the Medical Board to ensure that each student spends at least six months in residence. In addition, junior students are appointed as extern clinical clerks and surgical dressers. Women students are eligible on the same terms as men. Ample facilities exist for post-graduate work in the various special departments, as well as in general medicine and surgery. Extensive alterations and improvements have recently been made in the X ray, electrotherapeutic, and electrocardiographic departments. Two open-air huts to accommodate ten patients have been erected in the spacious Whitworth grounds. A new students' residency has been opened. This contains facilities for 20 male and 8 female residents.

Royal City of Dublin Hospital

The hospital contains 158 beds and a special wing for the treatment of fevers and contagious diseases founded by the late Mr. Drummond. There is a large nursery where special opportunities are afforded for the study of diseases of children, both medical and surgical. There are also special wards for ophthalmic, aural, and gynæcological cases; also a department for the Erlangen Treatment by deep therapy. There is a largely attended out-patient department, where students are allowed to attend accidents and dress cases under supervision. Six resident pupils are appointed every three months. A house surgeon and a house physician are appointed annually.

Dr. Steevens' Hospital

This hospital, at Dublin (Kingsbridge), contains 180 beds. There is accommodation for 10 resident pupils, each of whom is provided with a separate bedroom, and board is supplied by the hospital at a reasonable rate. There is an electric massage department, a "sun-ray" and diathermy department, and an X ray department. There are also two V.D. wards and a largely attended V.D. treatment centre, as well as a large ward reconstructed and re-equipped and opened as open-air ward for tuberculous and other diseases of bone (25 beds) for females, two open-air verandahs for male surgical tubercular cases (14 beds), and children's ward (12 cots).

All information with regard to the terms for such residency can be had from the Resident Surgeon at the Hospital.

Dublin—Meath Hospital and County Dublin Infirmary

The hospital contains 150 beds, available for clinical teaching, both medical and surgical. A separate fever block contains 40 beds. Special wards have been set apart for the reception of children.

Jervis-street Hospital, Dublin *

This hospital contains 120 beds. Eight resident medical officers are appointed each year and facility is thus given to past students of the hospital to acquire experience as house surgeons. Resident students are provided with apartments, fuel, and light, free of charge. Arrangements have been made by which students of the hospital can have special fever training in Cork-street Fever Hospital, free of charge.

St. Vincent's Hospital and Dispensary

This hospital has 200 beds. Clinical lectures in medicine and surgery are held from October to June. Special classes for juniors from October to December. Pathological and bacteriological demonstrations are given every Thursday, and instructions in the use of laryngoscope and otoscope for senior students every Saturday. Medals and Prizes: the Bellingham gold medal in Medicine and the O'Ferrall gold medal in Surgery are offered for competition at the end of the summer session, as well as junior prizes, also the McArdle Memorial Prize, value £20. There are a large extern department and a new pathological laboratory. A new electrocardiographic department has been installed.

Rotunda Hospital

The Rotunda Hospital, Dublin, is the largest combined gynæcological and maternity hospital in the British Empire. Over 4000 confinements are attended annually, and upwards of 1000 gynæcological patients admitted. Students can take out their necessary gynæcological and midwifery practical courses. The work of the hospital is carried on continuously through the year, and consists of daily clinical instruction in the maternity department, and examination and operations in the gynæcological department. Qualified students are given facilities for studying and assisting in the management of all abnormal cases so far as is practical. An antenatal dispensary is held three times weekly and all students are encouraged to attend. A special class in gynæcological examination and diagnosis is conducted by the Assistants to the Master. In addition there is a special class in operative obstetrics, limited in number. The pathological laboratory is under the supervision of a skilled pathologist, who gives special classes at intervals. There is a fully equipped X ray installation under the care of a competent radiologist. A ward has been opened for the treatment of infantile conditions, and is under the care of a pædiatrician, who gives instruction in the out-patient department, which is held daily. The appointments on the staff of the hospital are given to qualified past students of the hospital who have taken the L.M., and consist of Extern Assistants for six months, one being appointed every three months. From these the Assistants to the Master are appointed. Women students can reside in the hospital on the same terms as men. The mess room and sleeping quarters have been decorated recently and reading rooms are provided. The L.M. is granted by examination after a six months' course.

For further particulars apply to the Master.

Coombe Lying-in Hospital

The Coombe Lying-in Hospital and Guinness Dispensary for the Treatment of Diseases peculiar to Women, Dublin, contains 70 beds, and consists of two divisions, one of which is devoted to lying-in cases and the other to the treatment of diseases peculiar to women. Lectures are delivered, practical instruction given, and gynæcological operations are performed in the theatres daily. There is a large general dispensary, held daily, at which instruction is given on the diseases of women and children. There is a special afternoon dispensary held by the Master and his assistants, at which practical instruction in gynæcology is given. There is no extra charge for attendance at this dispensary, or at the prenatal clinic, held on three evenings a week, at which there are about 3000 attendances annually. Every year about 1200 women are delivered in the hospital and about 1500 on the district. There is accommodation for intern pupils, who enjoy exceptional advantages of acquiring a thorough knowledge of this branch of their profession. Women

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* No returns.

students can reside in the hospital. Clinical assistants are appointed from amongst the post-graduates as vacancies occur. Certificates of attendance at this hospital are accepted by all licensing bodies. Students can attend at any time. Plans for a new hospital of 136 beds, and a new residency for students, are now complete, and the building operations will begin in the near future.

Further particulars may be had on application to the Master or the Registrar at the Hospital.

National Maternity Hospital

This hospital at Holles-street, Dublin, consists of intern and extern maternity, gynæcological wards, and a dispensary for the treatment of diseases of women, an infant clinic, and an antenatal and postnatal branch. Every facility is given for the carrying out of practical work. Under-graduate and post-graduate courses are arranged at any time. Certificates of attendance at this hospital are recognised by all the licensing bodies. Clinical lectures are given daily and oral lectures four times per week. The L.M. Diploma is given by special examination, which is held four times a year. Total number of admissions last year 1628.

Further particulars can be obtained from the Master or from the Secretary.

QUEEN'S UNIVERSITY OF BELFAST

There are six degrees in the Faculty of Medicine of the University—viz., Bachelor of Medicine (M.B.), Bachelor of Surgery (B.Ch.), Bachelor of Obstetrics (B.A.O.), Doctor of Medicine (M.D.), Master of Surgery (M.Ch.), and Master of Obstetrics (M.A.O.). The University also grants a Diploma in Public Health and a Diploma in Psychological Medicine, particulars of which will be found in the University Calendar. The degrees of M.B., B.Ch., and B.A.O. are the primary degrees in the Faculty of Medicine, and are conferred at the same time and after the same course of study. No student is admitted to the final examination for these degrees until he has shown: (1) that he is a matriculated student of the University; (2) that he has completed the prescribed course of study in the Faculty of Medicine extending over a period of not less than five academic years from the date of his registration as a student of Medicine; (3) that he has passed the several examinations prescribed; (4) that he has attended in the University during three academic years at least the courses of study prescribed for such degrees (the Senate may accept, for not more than two academic years of the required five, courses of study pursued in any other University or School of Medicine approved by the Senate); and (5) that he has attained the age of 21 years. Every candidate for admission shall matriculate or fulfil such other test of fitness as may be prescribed by the Senate, or may be exempted from the matriculation examination by having passed similar examinations elsewhere.

For information as to Scholarships and Prizes, inquiry should be made of the Secretary of the University.

Primary Degrees of M.B., B.Ch., B.A.O.—All candidates for these degrees must satisfy the examiners in the subjects of four examinations.

The First Medical Examination.—The subjects of this examination are Chemistry (Inorganic and Organic), Experimental Physics, Botany and Zoology. The examination will be divided into two parts which may be taken separately: I., Chemistry and Physics; II., Botany and Zoology.

The Second Medical Examination.—The subjects are Anatomy and Practical Anatomy, Physiology and Practical Physiology. Candidates who have previously passed the First Medical Examination may present themselves for this examination at the close of their second year.

The Third Medical Examination.—The subjects are: (1) Pathology and Practical Pathology; (2) Materia Medica, Pharmacology, and Therapeutics; (3) Medical Jurisprudence; (4) Hygiene. Candidates who have previously passed the Second Medical Examination may present themselves for Part I. of this examination at the close of the third year, and for Part II. at the end of the Winter Session of the fourth year. Attendance on a course in any subject of the Third Medical Examination shall not entitle a student to a certificate of attendance unless he has previously passed in all the subjects of the Second Medical Examination.

The Fourth Medical Examination.—The subjects are: (1) Medicine; (2) Surgery; (3) Midwifery and Gynæcology; (4) Ophthalmology and Otology. Candidates who have previously passed the Third Examination may present themselves for the Fourth Examination at the close of the fifth year, provided that they have fulfilled the necessary requirements as to attendance, &c., on the courses of instruction in the subjects of examination and on the clinical courses in the hospitals. Attendance on a course in any subject of the Fourth Medical Examination shall not entitle a student to a certificate of attendance unless he has passed in the subjects of Part I. of the Third Medical Examination.

Degrees of M.D., M.Ch., and M.A.O.—These degrees are not conferred until the expiration of at least three academic years, or in the case of graduates of the University in Arts or Science of at least two academic years, after admission to the primary degrees in the Faculty of Medicine. Every candidate must show that in the interval he has pursued such courses of study, or been engaged in such practical work as may be prescribed. These degrees may be conferred by the Senate either (*a*) after an examination, which includes written, oral, clinical, and practical examinations; or (*b*) on the submission of a thesis or other evidence of original study or research, to be approved by the Faculty of Medicine after an oral or other examination of the candidate on the subject.

The Medical School.—The Donald Currie Chemical Buildings contain a lecture theatre, a preparation room, a chemical museum, a large class-room for elementary practical chemistry, laboratories for qualitative and quantitative analysis, rooms for water and gas analysis, dark room for photographic purposes and balance room, provided with all modern appliances. The Anatomical Department contains a large and well-lighted dissecting-room, a lecture-room, a professor's and demonstrator's room, a bone-room, and a laboratory for microscopic and photographic work. The Medical Museum is in the same building. The Jaffé Laboratories for Physiology comprise a lecture theatre, laboratories for practical work in chemical physiology, histology, and experimental physiology, and in addition small private research rooms, including balance, galvanometer, and centrifuge rooms. The J. C. White laboratories are fully equipped for research in biochemistry and bacteriology. In the Musgrave Pathological Laboratory opportunity is afforded for research in pathology and bacteriology. The department is in touch with most of the hospitals in Belfast, and there is an ample supply of material for investigation by graduates in morbid histology, clinical pathology, and the bacteriology of infectious diseases. A course in pathology or bacteriology is given to graduates, and members of this class have an opportunity of seeing the methods employed in the various investigations carried out in the department for the Public Health Committee of the Corporation in connexion with water-supply, sewage disposal, meat- and milk-supply, and the diagnosis of cases of infectious diseases. The certificate issued to members of the class in bacteriology qualifies for the D.P.H. degree. The Pharmaceutical Laboratory is fitted and equipped for the work of practically instructing students in the compounding and dispensing of medicines.

Clinical Instruction.—The following institutions are recognised by the University as affording proper opportunities for clinical instruction: the Royal

Victoria Hospital, the Mater Infirmorum Hospital, the Belfast Hospital for Sick Children, the Belfast Maternity Infirmary and Hospital, the Ulster Hospital for Women and Children (56 beds), the Benn Ulster Eye, Ear, and Throat Hospital (30 beds), the Belfast Ophthalmic Hospital (30 beds), the City Fever Hospital, Purdysburn (360 beds), the Union Fever Hospital (200 beds), and the Belfast District Lunatic Asylum, where the Purdysburn Villa Colony has 1350 beds.

Complete information can be obtained from the respective Secretaries.

Royal Victoria Hospital, Belfast

There are 436 beds. Students eligible for McGrath, McQuitty, Malcolm, Coulter Smyth, and Elwood Scholarships aggregate annual value £185. Twelve house surgeons and house physicians. Thirty-six resident pupilships, three months each, annually for senior students, of which a proportion is allotted to women students, special departments for radiology, clinical pathology, V.D., dermatology, gynæcology, vaccine therapy, electrocardiography, dentistry, radium therapy. Post-graduate lectures and demonstrations are given on Wednesdays throughout the year with the exception of holiday seasons.

Mater Infirmorum Hospital, Belfast

This hospital contains 270 beds and is open at all hours for the reception of accidents and urgent cases. Clinical instruction is given daily by Physicians and Surgeons. Surgical operations are performed daily. The out-patient departments in medicine and surgery, also the special dispensaries for gynæcology, ear, eye, and throat, electrotherapeutics, venereal diseases, varicose veins and hæmorrhoids are very largely attended and afford valuable opportunities to students for the study of those subjects. There is a well-equipped electro-medical and massage department. There is also a dental dispensary. A house physician and two house surgeons are elected every six months. Resident pupils are admitted as the vacancies arise. Three Exhibitions and a Gold Medal are competed for annually in June. Certificates of attendance upon this hospital are recognised by all the Universities and licensing bodies in the United Kingdom.

Belfast Hospital for Sick Children

At the hospital in Falls-road there are 73 beds, and clinical instruction is given. During the winter and summer sessions courses of lectures are delivered on the medical and surgical diseases incidental to infancy and childhood. Demonstrations in ophthalmology and pathology are given, and ample opportunities are afforded in the wards and in the out-patient department for gaining a practical and theoretical knowledge of the diseases of infancy and childhood. This hospital grants Certificates in Diseases of Children, which are recognised by the various examining bodies. Certificates are also granted for post-graduate study. A Gold Medal is offered for competition at the close of the session. A Davis Scholarship is awarded every two years for the best thesis on some branch of children's diseases.

Belfast Infirmary and Hospital

There are 1700 beds. Clinical courses are given quarterly, and a course for D.P.H. in hospital. An intern venereal clinic in infirmary is under the Corporation scheme. The maternity wards are recognised for practical midwifery training. The certificates of the vaccination class are recognised by the Local Government Board. There is a department for cancer with 32 beds, also X ray, bacteriological, and massage departments.

Royal Maternity Hospital, Belfast

This new building is in the grounds of the Royal Victoria Hospital and will supersede the maternity hospital in Townsend-street. It will be formally opened in October. There are 100 beds and an antenatal department catering for a large district. There is also an infant clinic and a department for venereal diseases and a separate septic block. The University obstetric tutor resides in the hospital and acts as senior resident medical officer. There are three house surgeons in addition, and resident accommodation for 15 resident students or post-graduates.

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CONJOINT EXAMINING BOARD

The Conjoint Board of the Royal College of Physicians of Ireland and Royal College of Surgeons in Ireland requires of candidates the passage either of its own preliminary examination in the subjects of general education or proof that the candidate has passed one of the tests accepted by the General Medical Council as well as passing in the Pre-Registration Examinations in Chemistry and Physics and Biology.

Professional Examinations.—There are three professional examinations, the first of which cannot be completed earlier than the end of the second winter session, nor the final before the conclusion of full five years of medical study. Before being admitted to any of them the candidate must show that he has studied the different subjects in practice and theory for the requisite periods, certificates to this effect being accepted from the authorities of most of the recognised medical schools at home and abroad. The first examination consists of Part I. (*a*) Biology, (*b*) Applied Chemistry and Physics ; Part II., Anatomy and Physiology. The second examination deals with (*a*) Pathology, (*b*) Materia Medica, Pharmacy, and Therapeutics, (*c*) Forensic Medicine, Hygiene, and Public Health, (*d*) Ophthalmology, and may be taken separately.

Final Examination.—This is divided into three divisions, which cannot be completed until at least five years have passed in medical studies other than those for the Pre-Registration Examinations, and five years at least since the beginning of the curriculum. The divisions are (*a*) Medicine, including Fevers, Mental Diseases, and Diseases of Children ; (*b*) Surgery, including Operative Surgery ; (*c*) Midwifery, including Diseases of Women and Children, and the Practice of Vaccination.

Diploma in Psychological Medicine.—There are two examinations in connexion with this Diploma : Part I. consists of (*a*) Anatomy and Physiology of the Nervous System ; (*b*) Psychology. Part II. : (*a*) Neurology, including Clinical and Pathological Neurology ; (*b*) Psychological Medicine, including its legal relationships.

Further information can be obtained from the Secretary of the Committee of Management, Royal College of Surgeons, St. Stephen's Green.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

The College issues its Licences in Medicine and in Midwifery to practitioners whose names appear on the Medical Register of the United Kingdom.

The Licence in Medicine.—The subjects of examination are : Practice of Medicine, Clinical Medicine, Pathology, Medical Jurisprudence, Midwifery, Hygiene, and Therapeutics.

The Licence in Midwifery.—Candidates must produce certificates of registration. A registered medical practitioner of five years' standing may be exempted from the examination by printed questions.

The Membership.—Examinations for Membership are held in February, June, and November.

The Fellowship.—Fellows are elected by ballot. An applicant must have been a Member of the College for at least one year and must have attained the age of 27 years.

Further particulars can be obtained from the Registrar of the Royal College of Physicians of Ireland, 6, Kildare-street, Dublin.

ROYAL COLLEGE OF SURGEONS IN IRELAND

The College issues its Licence in Surgery to practitioners whose names are entered either on the Medical Register for the United Kingdom, the Colonial Medical Register, or the Foreign Medical Register of the year in which he presents himself for examination, and who satisfies the Council that he has passed through a course of study and Examinations equivalent to those required by the Regulations of the Irish Conjoint Board.

Candidates are examined in General Surgery (paper and oral), Clinical Surgery, Surgical Pathology (oral), Operative Surgery, Surgical Anatomy (paper), and Ophthalmic and Aural Surgery (clinical).

Diploma in Midwifery.—A diploma in Midwifery is granted after examination to persons possessing a registrable qualification.

Fellowship Examinations.—Candidates for the Fellowship shall make application to the President and Council to be admitted to examination. They are required to pass two examinations—Primary and Final. Candidates may present themselves for the Final Examination immediately after passing the Primary part, provided they have complied with the necessary regulations. The subjects for the Primary Examination are (*a*) Anatomy, including Dissections; and (*b*) Physiology and Histology. The subjects for the Final Examination are Surgery, including Surgical Anatomy and Pathology. For admission to the Final Examination the candidate must have passed the Primary Examination, and must be a Licentiate or Graduate in Surgery of a university or licensing body recognised by the General Medical Council; all such candidates must not be less than 25 years of age.

Further particulars can be obtained from the Registrar of the College, Stephen's Green West, Dublin.

Schools of Surgery

The Schools of Surgery are attached by Charter to the Royal College of Surgeons and have existed as a department of the College for over a century. They are carried on within the College buildings and are specially subject to the supervision and control of the Council, who are empowered to appoint and remove the professors and to regulate the methods of teaching pursued. The buildings have been reconstructed, the capacity of the dissecting-room nearly trebled, and special pathological and bacteriological laboratories are fitted with the most approved appliances in order that students may have the advantage of the most modern methods of instruction. Winter Session commences in October; Summer Session in April. Scholarships and Prizes: Carmichael Scholarship, £15; Mayne Scholarship, £8; Stoney Memorial gold medal; Operative Surgery, gold and silver medals; Barker Prize, £26 5*s.*; H. Macnaughton-Jones gold medal in Obstetrics and Gynæcology; and class prizes and medals. Prospectus and guide for medical students can be obtained post free on written application to the Registrar, Royal College of Surgeons, Stephen's Green W., Dublin.

APOTHECARIES' HALL OF IRELAND

The Licence of this Hall is granted to students who present certificates of having fully completed the course of study as laid down in the curriculum and who pass the necessary examinations. The diploma of the Hall entitles the holder to be registered as a practitioner in medicine, surgery, and midwifery, with also the privileges of the Apothecary's Licence.

Candidates must pass three Professional Examinations, called the First and Second Professional Examinations and the Final Examination, which are conducted at separate times, partly in writing, and partly practically and orally. The Examinations are held twice a year—viz., in June and January, or such other dates as may be determined.

Candidates who produce satisfactory evidence of having passed an examination for a Degree or Licence in Medicine, conducted by any University or Royal College in the British Empire, or by any Foreign University whose Degrees are recognised in the Foreign List of the Medical Register, will be exempted from the Primary Examination.

The subjects for the First Professional Examination are: Anatomy, Physiology and Histology, including Biochemistry; and for the Second Professional, Materia Medica and Pharmacy, Pathology, and Medical Jurisprudence and Hygiene.

For the Final Examination the subjects are: (*a*) Medicine and Clinical Medicine and Clinical Methods. (*b*) Surgery—Clinical, Ophthalmic, and Operative; and Surgical Anatomy. (*c*) Midwifery and Gynæcology, and Practical Pharmacy and Materia Medica (if not taken at Intermediate Examination).

Each candidate before receiving his diploma must produce evidence that he has attained the age of 21 years. The details of the course of education required and syllabus of the examinations will be supplied by the Registrar at 95, Merrion-square, Dublin.

WE take this opportunity of thanking the officials of Government Departments and the Deans and Secretaries of the various institutions for their kind coöperation in enabling us to bring the information contained in our Students' Number up to date

THE MEDICAL CURRICULUM

ELEVEN articles, which ran through our columns last year, took the shape of a series of opinions upon the existing system of medical education, asking frankly "What is Wrong with the Curriculum?"; they were contributed by request from authors who for various reasons were in a position to speak. A strong feeling clearly exists that the length of time necessary for carrying out the requirements of the educational authorities is such that unnecessary burdens are placed upon many students. There is not only an overloaded series of examinations to pass, but many students of high intelligence feel the economic stress which the duration of the course causes. It was also held by more than one writer that the curriculum now fails in some measure to produce sufficient practitioners of the type which the nation needs and can best employ; there is a belief that the young graduate has not been enabled by his training to handle adequately the situations which he meets with in practice, however far-ranging his scientific equipment may be. Many efficient teachers, while they feel that their primary concern must be the training of students to pass examinations and become practitioners, want to hand on to their students something of the wider fields of knowledge lying behind the subjects of immediate concern, and this they find it difficult to do without encroaching upon the over-occupied and strictly allotted time periods. Further, it is seldom that any opportunity is found for pointing out to students the important part which psychological processes play in the causation and treatment of disorder.

The following are the exact references to the articles in question:—

(1) Major Greenwood, D.Sc., F.R.C.P., F.R.S. (June 11th, 1932). (2) Ralph M. F. Picken, M.B., B.Sc., D.P.H. (June 18th, 1932). (3) G. Grey Turner, M.S., F.R.C.S., F.A.C.S. (June 25th, 1932). (4) A. E. Boycott, D.M., F.R.C.P., F.R.S. (July 2nd, 1932). (5) Frank E. Tylecote, M.D., F.R.C.P., D.P.H. (July 9th, 1932). (6) Lindsey W. Batten, M.B., M.R.C.P. (July 16th, 1932). (7) Bernard Hart, M.D., F.R.C.P. (July 23rd, 1932). (8) Leslie Cole, M.D., M.R.C.P. (July 30th, 1932). (9) T. Izod Bennett, M.D., F.R.C.P. (August 6th, 1932). (10) W. Burton Wood, M.D., M.R.C.P. (August 13th, 1932). (11) F. B. Byrom, M.D., M.R.C.P. (August 20th, 1932).

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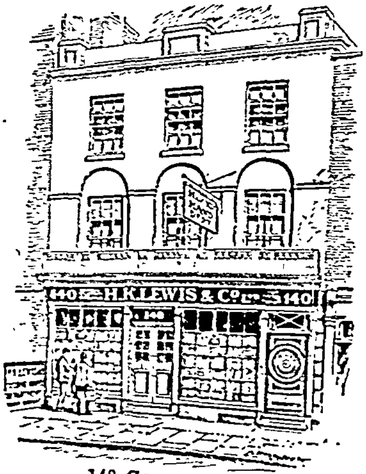

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THE LANCET

LONDON: SATURDAY, AUGUST 26, 1933

PROFESSIONAL PROSPECTS

A QUESTION which it is pertinent to put at the eve of the opening of a new medical year reaches us from a correspondent in the following words, accompanying an inquiry after the publication of the Students' Number of THE LANCET for 1933-34. "I should be extremely obliged," he writes, "if you could give me some idea of the general prospects in the profession during the next four or five years." The question is simple, in that there can be no doubt of the kind of information which the writer seeks, but the answer is not so simple; to have any significance it should be the result of deductions, which can be of use only so far as they are based on facts, and as the evidence from the facts can be found to converge in some general message. In making an attempt to estimate what are the general prospects in the medical profession during the period named three things have to be taken into consideration—what the profession is like now; what it was like before certain fundamental changes in more or less recent circumstances occurred; and, thirdly, how far modifications, following on such changes and active to-day, are likely to proceed in logical fashion. Reliance can be placed upon the probability that evolution will take place in reasonable sequence, but the sequence may be interrupted, as it was some 20 years ago, by unexpected mutations, and to frame anticipations of these would certainly be to guess rather than to estimate.

The present position of the medical profession is just now a subject of intense interest to the onlooker from the outside. The training of medical students, the management of hospitals, the duties and responsibilities of the practitioner—his shortcomings rather than his virtues—are subjects of regular criticism and often of irregular denunciation. The public is rightly interested in these matters, and medical men acknowledge cheerfully that from the public valuable practical suggestions have emanated which, while improving medical service, tend to better the conditions under which that service is rendered. And as we doctors exist to minister to the public it is necessary that there should be close coöperation between us and them in the carrying on of our work. But a sociologist, delivering his opinions as an onlooker, does so with a detachment which is quite impossible for those who are actually of the profession. He stigmatises much medical training as being unnecessary for the doctor's daily task; he points to the hospital as the all-inclusive resort where the task is, in his opinion, not a daily one; and in regard to the domestic practice under which some fifteen millions of the population are treated he is ready with many instances where the machinery or the man behind it appears ineffective. It is quite good that we should be told these things, and certain truths in them are apparent; but the lay critic, however well equipped, cannot be expected to realise the reasons or the utility of much which he is evaluating; accordingly the mirror held up to medicine by outside censorship is apt to present distortion in its reflections. Doctors know the reasons for their scheme of education; they know the internal circumstances in which institutional treatment is carried on and how these are linked up with the educational schemes; and they know the many varying circumstances in which they have to place the outcome of their education and experience at the disposal of the public. To much criticism, sometimes sensible, and sometimes appearing more sensible than it is, the answer may be that the advice tendered cannot be followed, because existing methods are dependent on Acts of Parliament, on local administration, on the history of universities, and on professional customs, which have grown up in response to public needs. Alterations, in such positions, can only have successful issue through substitutions which, while meeting the proposed reform, would have no dislocating effect upon other quite satisfactory conditions of professional life. Unrest in the profession is fostered by the kind of criticism which medical practice often receives and which has an undue effect upon medical men, although they may detect the weakness of the arguments. The present position of the medical profession is good at bottom. Practice is based upon careful training, and treatment is available for all sections of the public under conditions better than any previously existent. But these things can only be said with reservation, while it is universally recognised that the methods of training are imperfect, and that the conduct of practice has many drawbacks.

We set out in the Students' Number the details of the medical curriculum as it is planned for all medical students, having regard alike to the standards set by the General Medical Council and to the particular circumstances of the various educational centres. Let us imagine a reader not consulting only the place at which he seeks particular information (where we trust that he will find it), but studying the whole contents of the Number. Will he not be struck at once with the probability that there would be obstacles to the arrangement under any general pattern of so many educational schemes, though all will have the same object—namely, that of training medical men to serve the public. Those obstacles were aptly illustrated by two series of articles published during the past year in THE LANCET. The first of these entitled "What is Wrong with the Medical Curriculum?" proved the existence of wide dissatisfaction with the educational pattern. Yet the general message was encouraging, in that certain of the defaults revealed were obviously capable of reform. But it seemed indisputable that the time of the student was over-occupied, so that the association of medicine with other sciences could not be taken due advantage of by students. But proposals to meet the situation varied widely in accordance with opinions as to what proficiency in other sciences was needed, and at what stage in the curriculum it was to be acquired. There is no definite consensus of view as to the direction which the medical education of the future should take, in order that, at one and the same time, the routine of training should be lighter and yet more expansive. Entrance to the profession is guarded by the standardising powers and discretion of the General Medical Council, and the Council demands that tests of a certain strictness should be applied to students whose training has lasted for a certain period. Accordingly the direct aim before the teachers in the various schools is to train their students to pass the tests. To relieve the over-pressure of the student a simplification of these tests would have to take place, and without lowering standards which have been erected for the safety of the public. But how to ease the burden for the students while asking them to familiarise themselves more with the inter-relations between medicine proper and those sciences whose connexion with medicine grows daily more intimate, is a puzzle whose solution tarries.

Rearrangement of the curriculum so as to meet both horns of the dilemma would be simpler if the public need was itself a simple one. But it is exactly the reverse. Following upon the series illustrating the position of medical education there appeared a set of articles entitled "The Doctor's Day," in which we asked representatives of practically every section of the medical profession to give us an actual summary of their work as discharged during a typical 24 hours. General practitioners, consultants, and specialists contributed to this series; medical officers, functioning under various authorities, State and private, described their duties often in detail; those serving abroad, with the defence forces, in the colonial service, or in private capacity, told their stories; and chapters were included from practitioners standing in particular relation to the administration of the law. The articles disclosed the variety of responsibilities which a position on the Medical Register compels a man to incur, and the educational tests, satisfaction of which places the student on the Register, are supposed to fit him for all of them. There can be no method of examination, no tests of any scope which would transform a medical student in five years into such a monster of capacity. The way of meeting the difficulty constantly proposed, and already to a great extent adopted, is the institution of post-graduate courses by attendance at which the newly qualified man receives the training necessary to practise along the special line of his selection. The extent to which this movement has developed is reflected in the following pages and it is one which will grow in strength as the advantages of both general and special post-graduate teaching become still more widely known. But to ease the student's burden by omitting from his curriculum subjects which appear to be outside the daily round, calls for a definition of that round, and when we appreciate what its range may be, it becomes evident that the institution of post-graduate courses, however generous, is not going to meet the perplexities of medical training. To take full advantage of post-graduate courses, just as to perform the daily task, the qualified man must have passed through a fundamentally sound training, and the real problem before our educational authorities is to decide of what that consists, and how much of this specialised knowledge can be left for acquisition until after qualification.

While the educational curriculum requires attention urgently—and we believe that it does—the position of the general practitioner presents food for thought. The improving position of the voluntary hospitals and the development of the municipal hospitals will increase, and is intended to increase, the benefits which the public can derive from institutional treatment. This development will ease the educational situation by providing post-graduate training of the cheapest, and yet the most valuable sort—namely, a wide range of junior hospital appointments. But hospitals, voluntary or municipal, play the wrong rôle, when by their usufruct the public lose the advantages derived from intimate associations, through domestic practice, between the patient and the personal doctor. It is incumbent on all hospital authorities to remember this. It is with the hospital authorities that the duty lies to see that treatment is not dispensed within their walls which could be better given without. Abuse lies far more often in this direction than is realised. The exigencies of panel practice are very heavy and as time goes on the revolution in the doctor's professional life, created by the National Health Insurance Acts, is turning into an orderly organisation for the care of the insured. The relegation by practitioners to the hospitals of patients, for whom they ought to be able to do all that is required or is possible, will become less frequent with the regular improvement of facilities and the increasing appreciation of the public.

What then should be said to him who asks for an idea of the general prospect of the profession during the next four or five years? Our feeling is that the reply might be a cheerful one, but that the drawbacks must be faced frankly. The public are not alone in holding two things, that the training of the medical student is not directed towards practical medical service, and that the system of national contract practice is imperfect. To set aright the first the inquiries at the moment going on should surely discover remedies to be possible. Of contract practice we may say that it is steadily obtaining a shape that is fair both for those who give and those who receive. In regard to private practice we can point to the recent symposium, "The Doctor's Day," as showing that, while the life is hard and anxious and while the pecuniary rewards are, in general, slight, the pleasure in performance out-balances the drawbacks. Further, medical science progresses steadily in every branch, and thus its ministers enjoy the fine feeling that they all are in the movement, and are all contributing to the betterment of the world.

THE MEDICAL OFFICERS OF THE DEFENCE SERVICES

IN the immediately following pages the existing terms under which medical officers join the Defence Services are set out, but it is obvious from the report of the Warren Fisher Committee (THE LANCET, August 5th, 1933) that fundamental changes are in immediate contemplation. The report refers to the Naval, Army, and Air Force medical services. Since the war the medical departments of the Defence Services, although not perhaps all with equal seriousness, have been in the great difficulty that recruiting for them has been insufficient; they have been compelled to carry on largely with the assistance of retired officers or doctors employed upon short term contracts. This, however, did not mitigate the position for the regular officers of the Services, inasmuch as it did not prevent their retention abroad for an unfair proportion of their time; and this in turn deprived them of the opportunities for post-graduate study needed in order to consolidate and add to their knowledge. The Committee was set up some two years ago, but owing to the financial crisis of last year the sittings were suspended for a period. They issued their report at the end of July last, as the result of evidence furnished by the Government departments concerned, and after the reception of representations from many of the medical schools and from the British Medical Association. The Committee conclude that, while the economic position of the medical officers might to some extent deter recruiting, the more important factor here was the belief that in the Services there would be found insufficient openings for the young graduate in medicine, inspired with professional keenness. This belief the Committee has taken great pains to remove. The question was investigated personally by two members of their body, specially fitted to decide on such a matter, and the findings of these authorities are accepted in the report as largely contradicting an unlucky impression. It is allowed that the young graduate in medicine, with ambitions to reach the top of the tree, might not select for his career one of the Services, but the view of the report is that, with the Navy, the Army, and the Air Force alike, a good field can be found for specialist work. On the economic side, the inducements put forward by the report to the young graduate comprise certain adjustments in pay and increase in emoluments, amounting to an average of nearly £150 a year throughout the period between the ages of 35 to 50, this estimate being based on a revised pattern for the R.A.M.C. officer. An increase in the higher establishments is contemplated by the Committee, a due proportion of senior to junior posts being maintained through the employment of a certain number of officers chosen in the first instance for short service. Of these some will be retained under increased opportunities for promotion, while a gratuity of £1000 is suggested for such temporary officers in all three Services who retire after five years' employment.

The Naval and Military Committee of the British Medical Association will shortly commence a detailed examination of the report of the Warren Fisher Committee in the light of such endorsement as it has received from the Representative Body of the Association, and communications from medical men on the subject are invited and should be sent to the Medical Secretary of the Association.

THE BRITISH ASSOCIATION

ON Wednesday, Sept. 6th, the 102nd meeting of the British Association for the Advancement of Science will open at Leicester, when Sir Gowland Hopkins will deliver the presidential address, dealing with the Chemical Aspects of Life. Medical members of the meeting will find a good choice of subjects having more or less professional interest. The chemists are devoting part of their time to hormones, the zoologists will hear a presidential address on the mechanical view of life, the geographers are concerned with the water-supply of Leicestershire and the growth of population in the Midlands, and the engineers are giving their attention to the treatment and disposal of sewage. The proceedings of the section of physiology will open with a presidential address by Prof. E. D. Adrian on the activity of nerve-cells, and afterwards there will be discussions on disorientation and vertigo, on ossification, and on the chemical control of the circulation. The psychological section, which meets under the presidency of Prof. F. Aveling, will join the physiologists in the consideration of disorientation and vertigo, and will also consider the inheritance of acquired characteristics. The section of botany will meet the sections of zoology and physiology in a discussion on genetics, the section of agriculture gives an important place on its programme to the handling and food value of milk, and the section of education will debate among other things the cultural value of science. The Association met last at Leicester in 1907 when Sir David Gill, the astronomer, presided. The city possesses a literary and philosophical society established nearly a hundred years ago. It offers material in abundance for the study of the applications of science to industry. It possesses a university college and, although there is no medical faculty, Leicester offers for the visiting doctor the oldest and most successful example of a public medical service—and incidentally of a hospital for paying patients not run for profit.

THE 'DOCTOR'S DAY

THE following is a classified list of the articles in this series, with the issues of THE LANCET in which they appeared :—

GENERAL PRACTICE

In a City (Nov. 12th, 1932).
On the Urban Fringe (March 25th, 1933).
Country Doctor (Dec. 17th, 1932).
In the Depths of the Country (March 4th, 1933).

CONSULTANTS

Established Consultant (Dec. 24th, 1932).
Hospital Surgeon (Feb. 18th, 1933).
Obstetrician (April 15th, 1933).
Treating the Sick Mind (April 1st, 1933).

PUBLIC HEALTH

Metropolitan Health Officer (Feb. 25th, 1933).
County Health Officer (Nov. 19th, 1932).
Tuberculosis Officer (Jan. 21st, 1933).
Industrial Doctor (Feb. 4th, 1933).
Port Medical Officer (April 29th, 1933).
Medical Officer to a Public School (March 11th, 1933).

SPECIALISTS

Biochemist and Teacher (Dec. 10th, 1932).
Pathologist to a Provincial Hospital (April 22nd, 1933).
Anæsthetist (Jan. 7th, 1933).

SERVICES AND ABROAD

With the Guards' Brigade (March 18th, 1933).
In the Royal Air Force (April 8th, 1933).
Ship Surgeon (Feb. 11th, 1933).
An Indian Day (Dec. 3rd, 1932).
Near the West African Coast (Jan. 28th, 1933).

MEDICINE AND THE LAW

Coroner (Jan. 14th, 1933).
Medico-legal Consultant (Nov. 26th, 1932).
Policeman's Doctor (Dec. 31st, 1932).

THE MEDICAL SERVICES

NAVAL MEDICAL SERVICE

A Committee is at present considering the conditions of service of naval medical officers, and it is anticipated that various improvements will shortly result from the Committee's Report. The following information, however, represents the conditions prevailing at the present time. The Service needs recruits, but there always will be a certain number of young medical men to whom life in the Royal Navy appeals. To the man brought up in Naval surroundings or with Naval relations a career as a Medical Officer in the Royal Navy offers very definite attractions. In these days his professional knowledge will most certainly not rust anywhere; but especially in the Naval Hospitals will he have opportunities of practising every branch of his profession, except, of course, diseases of women. He can obtain one of the 60 paid specialist appointments. These include medicine, surgery, diseases of the eyes, diseases of nose, ear, and throat, radiology, anæsthetics, genito-urinary and venereal diseases, physical training, bacteriology, pathology, and hygiene. He will be encouraged to work hard and play hard. He will see the world under ideal conditions.

The right type of man for a Naval Medical Officer is a good doctor, keen on his work, keen on his play, and unselfish. If the doctor is of this type he is invariably everybody's friend. The Naval Officer and the blue-jacket are quick to recognise a Medical Officer who is keen on his work, thoughtful of his patients, and one who strives after improving the health of the Navy. Such a Medical Officer finds life agreeable, as everyone is ready to befriend him, and nowhere can one find more delightful friends than in the Navy.

Officers who have held appointments as Medical or Surgical Officers in Civil Hospitals for any period prior to entry, after qualifying, are eligible under the regulations to have their seniorities antedated by not more than one year.

To help men to take higher qualifications opportunities are given, when the exigencies of the Service will permit, for medical officers to take post-graduate courses prior to sitting for these higher examinations. A large number of Naval Medical Officers since joining the Navy have taken qualifications such as M.D., F.R.C.S., M.R.C.P., D.P.H., D.T.M., D.O.M.S., &c. It is recognised that this is good for the Navy and good for the officer himself.

WORK OF THE NAVAL MEDICAL SERVICE

In our large Naval Hospitals the medical, surgical, and specialist work is of a very high standard. The work is also exacting, and it is the aim of the Admiralty to arrange appointments as far as possible so that medical officers have an opportunity of alternating their work, not only at home and abroad, but also ashore and afloat.

To give Naval Surgeons opportunities for professional work has always been a very *definite policy* of the Admiralty, and within the last year or so this matter has received still further attention.

The *General and Specialist Courses* have been increased so that, as far as possible, every officer shall have a course of instruction of not less than four months' duration every *four* years. The number of specialists allowed is now 60 and the specialist allowance is 5*s.* a day.

The *total number* of Medical Officers in the Navy is about 400, including 1 Surgeon Vice-Admiral (Medical Director-General), 6 Surgeon Rear-Admirals, and 20 Surgeon-Captains, and every improvement has been made towards giving increased opportunities of advancement and accelerated promotion to the best men.

The advantages of the career with its period of strenuous clinical work, followed by a period of comparative leisure which can be devoted to study, stand out.

Not only has the keen Naval Doctor purely medical work to interest him. He has opportunities to emulate some of the great Naval Surgeons of the past, such as Darwin, Huxley, and many others, who have contributed so much to science.

MEDALS AND PRIZES

Gilbert Blane Medal.—This Medal is awarded annually to the Surgeon Lieutenant-Commander who obtains the highest aggregate marks at the examination for promotion to the rank of Surgeon-Commander. The award is subject to the approval of the Presidents of the Royal College of Physicians and Surgeons respectively and the Medical Director-General of the Navy.

Other awards and prizes open to Naval Medical Officers are the Chadwick Naval Prize, the North Persian Forces Memorial Medal, and the Parkes Memorial Prize.

PLAY IN THE NAVY

Recreation is a vital part of the Navy, and there is *no branch of athletics or field sports in which the Naval* Officer does not have an opportunity of trying his hand. Not only is the champion encouraged but also the less proficient.

In every home port and on most foreign stations there are opportunities for football, cricket, tennis, *golf, rowing, sailing, swimming, and all other sports.* On some foreign stations the Naval Officer can get shooting and riding in plenty, and so cheap that he *can indulge in them on his pay alone. In civil life at* home only a rich man could get such magnificent shooting as the Naval Officer does in some parts of the world.

PAY AND ALLOWANCES

Full Pay (Current Rates)

		£		£	
SURGEON LIEUTENANT (short service and permanent service)	from	432	to	471	per annum.
SURGEON LIEUTENANT - COMMANDER (promoted after six years' service)..	„	569	to	602	„
SURGEON COMMANDER (promoted after a further six years' service)..	„	730	to	925	„
SURGEON CAPTAIN (promoted by selection)	„	1055	to	1299	„
SURGEON REAR-ADMIRAL (promoted by selection)		1706			„
MEDICAL DIRECTOR-GENERAL (Surgeon Vice-Admiral) ..		2070			„

Allowances

An outfit allowance of £50 *towards cost of uniform is given.*

Allowances when in charge of hospitals and sick-quarters ..	10*s.* and 5*s.* per diem.
Sixty Specialist allowances of ..	*5s. per diem.*
Allowances to Senior Medical Officers in flag ships ..	5*s.* and 2*s.* 6*d.* per diem.

Accelerated promotion can be gained under certain conditions: provision allowance and lodging allowance are paid when victualling and accommodation are not provided. Servant's allowance is also payable in certain appointments

The extra allowances alluded to in this table are not to be looked upon as very exceptional. About a quarter of the Medical Officers of the Navy are drawing extra allowances.

The cost of living in the Navy is cheap, and an officer can live on his pay and enjoy life if he is not extravagant, especially if he does not embark in matrimony *too early. A small amount of private* means goes much further in the Navy than in civil life. The three vital points—pay, prospects, and promotion—*of the naval medical officer can be grasped* by referring to the above clear and brief table.

PENSION

Naval Officers retire at certain ages according to the rank they have attained. Except for those promoted to the 27 higher posts, the usual retiring age is 50 as Surgeon Commander, the appropriate pension according to scale being £534 per annum.

With his experience in the Service, together with specialist qualifications, the Naval Medical Officer is able to obtain excellent openings on shore, being still at the age of 50 able to hold his own with his civilian confrères and being professionally at his best.

The current scale of pensions is as follows :—

	Maximum retired pay.
SURGEON VICE-ADMIRAL ..	£1064 per annum, on vacating office.
SURGEON REAR-ADMIRAL ..	£899 per annum, at age of 60.
SURGEON CAPTAIN	£801 „ „ 55.
SURGEON COMMANDER	£534 „ „ 50.
SURGEON LIEUTENANT-COMMANDER AND SURGEON LIEUTENANT	£401 „ „ 45.

Officers permitted to withdraw receive gratuities on the following scale :—

	£
After 4 years' full pay permanent service ..	500
„ 8 „ „ „ „ ..	1000
„ 12 „ „ „ „ ..	1500
„ 16 „ „ „ „ ..	2250

Of recent years Medical Officers have been admitted into the Navy without entrance examination, and for short service, with the option of turning over to the permanent service, but it is anticipated that it will not be long before the Admiralty will revert to the old established system of entrance by competitive examination twice a year, in batches of about ten officers.

The Medical Director-General of the Navy, Admiralty, Whitehall, London, S.W.1, would be glad to receive inquiries from prospective candidates.

Dental Branch.

The Naval Dental Service offers similar opportunities to qualified dental surgeons except that higher rank than that of the recently instituted Surgeon Captain (D) is not open to them. They are provided with suitable surgery accommodation equipped with modern appliances and supplied with all material required for their work, and there is every opportunity for them to maintain a high standard of professional skill.

Candidates are required to produce certificates of birth, registration, and of character, and must be physically fit for active service anywhere. An outfit allowance of £50 is payable to officers finally entered and commissioned. The rank of Surgeon Lieutenant Commander (D) is attained on the completion of six years' satisfactory service. Promotions to Surgeon Commander (D) and Surgeon Captain (D) are made strictly by selection from the rank next below and are confined to officers who prove fitted in every respect for these ranks. The present establishment of dental officers is : 1 Surgeon Captain (D), 3 Surgeon Commanders (D), 60 Surgeon Lieutenant-Commanders (D) and Surgeon Lieutenants (D).

Provision has been made for candidates who have held, or who, at the time of passing the examination hold or are about to hold, an appointment as Dental Officer in a recognised Civil Hospital. The time concerned, provided it does not exceed six months, may reckon for increase of full pay while on the active list.

On the completion of two years' service in the rank of Surgeon Lieutenant-Commander (D), dental officers on the Active List are eligible for a three months' post-graduate course at a dental hospital and school at the public expense, and will draw full pay while attending the course.

Pay.—The current rates of full pay for Dental Officers are as follows :—

	£ £
Surgeon Lieutenant (D)	356–438
Surgeon Lieutenant-Commander (D) (promoted after six years' service)	529–651
Surgeon Commander (D) (promoted by selection to fill vacancies in Establishment)	690–885
Surgeon Captain (D) (promoted by selection to fill vacancy in Establishment).. ..	1016–1259

The Regulations regarding Pension and Withdrawal Gratuities are the same as for Medical Officers in the corresponding Ranks.

In 1919, when new rates of pay for all Naval Officers were fixed, it was decided that 20 per cent. of these rates should be considered as due to the then high cost of living. The rates of pay shown above are those payable on and after Oct. 1st, 1931, and represent a reduction owing to the decrease in the cost of living. The 20 per cent. above mentioned is to be regarded as variable and subject to change at six-monthly intervals, either upwards or downwards according as the cost of living rises or falls.

ARMY MEDICAL SERVICE

Royal Army Medical Corps

SINCE the publication of the Royal Warrant of 1926 further improvements have been made in the conditions of service in the Royal Army Medical Corps, but the number of R.A.M.C. officers is some 18 per cent. below establishment. This fact militates against the Service, by making the time spent abroad proportionately long. The situation has interfered with recruiting.

The regulations for admission giving full details should be obtained from the Permanent Under Secretary of State (A.M.D. 1), War Office, Whitehall, London, S.W.1, and carefully studied. A personal interview with a representative of the Director-General, Army Medical Services, is readily obtainable.

The rates of pay and allowances should prove more attractive than they do, for the opportunities of post-graduate study are generous, and the work is varied, responsible, and interesting. The gratuities after certain periods of service enable an officer, should he so desire, to leave the Service with a capital sum large enough to go a long way towards re-establishing himself in civil life, and, further, the knowledge of the world and the comradeship of his fellow officers that he has gained in the Army will be of no small value to him.

New entrants are commissioned in the rank of Lieutenant, and the first six months of service are spent on probation, during which time they undergo, in addition to their Military training at the Royal Army Medical Corps Depôt at Aldershot, a probationary course at the Royal Army Medical College in London in Hygiene, Pathology, Tropical Medicine, Military Surgery, Recruiting, the prevention and treatment of Venereal Disease, and the elements of Army Administration. At the end of this course, and after qualifying at the necessary examinations, their commissions are confirmed, and they take their places in seniority according to the total marks obtained at all examinations up to that date. Officers Training Corps service with possession of Certificate "B" (Medical) carries a definite value in marks in this total.

An entrant who is holding or about to hold at the time of the entrance examination an approved whole-time Appointment at a recognised Civil Hospital may be seconded while holding such an appointment up to a maximum period of 12 months. A candidate who has held such an appointment within six months of entry may be granted an antedate up to 12 months in respect of the period the appointment was held. This secondment and antedate count in all respects as commissioned service, except that pay will not be issued for that period.

After a total period of one year's service at home the young officer goes abroad, probably to India, for his first tour of foreign service. Here he gains his first practical experience of tropical disease and tropical hygiene, and possibly his first experience of active service on the frontiers of India. His tour abroad lasts five years, with probably six months' leave home during that time. On returning home the R.A.M.C. officer has the opportunity to decide whether he will remain in the Corps or accept the gratuity of £1000 after seven years' service, and try his fortune in civil life. If he elects to remain, he will, between

PAY AND ALLOWANCES * (HOME RATES)

Rank.	Pay.†	Rations.	Servant.	Married.			Unmarried.		Approximate total per annum.	
				Lodging.	Fuel and Light.	Furniture.	Lodging.	Fuel and Light.	Married.	Unmarried.
	£ s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	£	£
Lieutenant	0 19 6	1 3	2 0	3 6	1 8	2 0	2 6	0 8	546	473
Captain	1 4 0	1 3	2 0	4 6	2 9	2 0	2 6	0 8	666	555
After 8 years' service ..	1 6 8	1 3	2 0	4 6	2 9	2 0	2 6	0 8	715	604
„ 10 „ „ ..	1 9 0	1 3	2 0	4 6	2 9	2 0	2 6	0 8	758	647
Major	1 13 4	1 3	2 0	4 6	2 11	2 0	4 0	1 3	840	764
After 15 years' service ..	1 17 10	1 3	2 0	4 6	2 11	2 0	4 0	1 3	922	846
„ 18 „ „ ..	2 0 0	1 3	2 0	4 6	2 11	2 0	4 0	1 3	961	885
„ 20 „ „ ..	2 4 6	1 3	2 0	4 6	2 11	2 0	4 0	1 3	1044	968
Lieutenant-Colonel	2 11 2	1 3	2 0	4 6	3 0	2 0	4 6	2 5	1167	1120
After 3 years' service as such	2 15 8	1 3	2 0	4 6	3 0	2 0	4 6	2 5	1249	1202
Colonel	3 2 4	1 3	2 0	5 6	3 11	2 0	5 6	2 9	1406	1348
Major-General	4 4 6	1 3	4 0	11 0	5 0	2 0	11 0	3 11	1967	1911

* Rates of Allowance vary from time to time and issues are subject to conditions laid down in Allowance Regulations.
† The rates of pay are subject to revision on or before April 1st, 1934.

his eighth and twelfth year of service, undergo a course of post-graduate study at the Royal Army Medical College and the London hospitals of five months' duration, followed by a course of study of a special subject selected by himself, provided he has shown special aptitude in the post-graduate course or during his previous service. During this period of study he remains on full pay, and the fees for the courses are paid by the State. When qualified in his special subject, the officer becomes entitled to specialist pay at 4*s.* 6*d.* per day when holding a specialist appointment. After this post-graduate course the officer probably proceeds abroad again and promotion to Major rapidly ensues, and from that time onward the officer receives regular successive increases of pay, and is eligible for additional and charge pay as well. The Directorates of Hygiene and Pathology and the appointment of two serving officers as Consultants in Medicine and Surgery have been instituted and have proved a marked success, all these appointments being of the rank of Colonel or Major-General.

In addition to the grant of permanent commissions, the War Office offer a number of temporary commissions in the Royal Army Medical Corps, the holders of which may be invited at the end of 12 months' service, if suitable, and provided that vacancies exist, to accept permanent commissions in the Royal Army Medical Corps. If a permanent commission is accepted, the temporary service is allowed to count as the equivalent of permanent service for promotion, increase of pay, and retired pay. These conditions enable the young medical man to make acquaintance with army life, without detriment to his ultimate prospects, before deciding whether to make a permanent career in the Royal Army Medical Corps.

The possibilities for good workers are very great. There is scope for original research in tropical disease, in preventive medicine, and in bacteriology, as well as in the large clinical field open to the specialist in Medicine, Surgery or Gynæcology, in Venereal Disease, and in Ophthalmology. Child welfare is also undertaken systematically by officers of the Royal Army Medical Corps.

At the same time instruction in administration is continuous. The Royal Army Medical Corps is essentially organised for war, and one of the lessons of the Great War was that trained administrators must exist to enable the fullest benefit to be obtained from professional talent. Many appointments carrying administrative responsibility are open to those officers who display capacity for this duty. All officers must be prepared to undertake command and to have a knowledge of Army administration, especially in war. Equally important is the technical training of the Non-commissioned Officers and men of the Corps in such "trades" as Trained Nurse, Nursing Orderly, Masseur, Radiographer, Operating Room Assistant, Laboratory Assistant, Hospital Cook, Dispenser, &c. This training is carried out by the Officers and Nursing Sisters, and opens a large field for those who have ability in lecturing and teaching as well as the power of influencing men.

PROMOTION

Promotion takes place automatically to Captain after 3½ years, and to Major after 12 years' service, provided the officer is qualified and recommended for promotion. Promotion to the higher ranks is by selection from those senior in the rank below, but special promotion by brevet or otherwise is open to officers of the Royal Army Medical Corps.

ADDITIONAL PAY AND CHARGE PAY FOR R.A.M.C. OFFICERS

(1) Officer not above the rank of lieutenant-colonel, while acting as specialist in a post considered by the Army Council to merit the grant of additional pay, according to subjects or groups of subjects as under.

Operative Surgery, advanced; Medicine; Ophthalmology; Gynæcology and Midwifery; Dermatology and Venereal Disease; Otology, Laryngology, and Rhinology; Radiology; Anæsthetics; Mental Diseases; Hygiene; Pathology; subjects other than above, at the discretion of the Army Council, 4*s.* 6*d.* daily.

(2) (*a*) Officer in charge of a hospital.—If the number of equipped beds, as certified by the Deputy Director of Medical Services, exceeds—

50 beds ..	2*s.* 6*d.* daily.	300 beds ..	7*s.* 6*d.* daily.
150 „ ..	5*s.* 0*d.* „	500 „ ..	10*s.* 0*d.* „

Officer in charge of a medical or surgical division of a general hospital with not less than 300 beds—half the above rates.

	Daily. *s.* *d.*
(*b*) Senior medical officer, Royal Arsenal, not exceeding	10 0
(*c*) Officer in command of the depôt, Royal Army Medical Corps	5 0
(*d*) The senior officer of the Army Medical Services with an army in the field: a rate to be fixed by the Army Council according to the magnitude of the charge.	
(*e*) The officer, if under the substantive rank of colonel, holding the appointment of senior medical officer in a command abroad, or of assistant director of medical services, if the number of soldiers is 1500 or upwards.. ..	5 0
(*f*) Adjutant R.A.M.C. Depôt	5 0
(*g*) Adjutant R.A.M.C. (Territorial Army) ..	2 6

RETIREMENT AND RETIRED PAY

The following are the rates of retired pay :—

1. Retired pay will consist of two parts : (*a*) a service element based on the officer's total service ; (*b*) a rank element for the rank from which the officer retires. An officer with less than 20 complete years' service will not be eligible to retire voluntarily on service retired pay.

2. The scale will be as follows, subject to the reduction of 11 per cent. referred to below :—

(*a*) Service element.—£15 a year for each completed year of service as a medical officer.

(*b*) Rank element.—

Rank from which retired.	After completing 1 year's service in the rank.	After completing each additional year's service.	Maximum rank element.
	£	£	£
Major	12	12	120
Lieutenant-Colonel	150	30	240
Colonel	290	50	390
Major-General ..	440	50	540
Lieutenant-General	590	50	690

The retired pay of an officer retiring with less than one complete year's service in the rank from which he retires will be assessed as though he had retired from the rank below.

Maximum rates of retired pay (*a*) and (*b*) together :—

	£		£
Captain and Subaltern ..	300	Colonel	800
Major	450	Major-General ..	1000
Lieutenant-Colonel ..	600	Lieutenant-General	1200

The above rates are those laid down in the Pay Warrant. They have been reduced by 11 per cent. as from Oct. 1st, 1931, and are subject to further revision on or before April 1st, 1934.

3. Officers may be permitted to retire with a gratuity in accordance with the following scale :—

After 7 years' service as a medical officer ..	£1000
„ 15 „ „ „ „ ..	£2800
„ 18 „ „ „ „ ..	£3500

The Army Dental Corps

This Corps is administered by the Director-General, Army Medical Services. Regulations for admission to the Army Dental Corps should be obtained from the Under Secretary of State, War Office, and carefully studied.

OFFICERS : APPOINTMENT AND PROMOTION

1. Commissions as Lieutenants in the Army Dental Corps may be given to persons duly qualified under regulations approved by the Army Council.

2. An officer who is commissioned after holding an approved whole-time appointment in a recognised civil dental hospital or in the dental department of a recognised civil general hospital may be granted an antedate covering the period of his appointment, but not exceeding six months, provided that the interval between the termination of the hospital appointment and the date of entry into the Service does not ordinarily exceed six months. The period of such antedate will reckon towards promotion, increase of pay, gratuity or retired pay.

3. An officer is eligible for promotion to the rank of Captain on completion of three and a half years' service and to the rank of Major on completion of 12 years' service in the Corps, provided he has previously qualified in such manner as may be prescribed by the Army Council.

4. Promotion to the rank of Lieutenant-Colonel and Colonel to fill the establishments laid down from time to time for those ranks is made by selection from those senior in the rank below. Dental officers are also eligible for special promotion by brevet.

PAY

The following are the rates of pay for officers of the Army Dental Corps. These rates are subject to revision on or before 1st April, 1934.

	Per diem.		
	£	*s.*	*d.*
Lieutenant	0	17	10
Captain	1	2	4
Captain { after 8 years' total service	1	5	0
„ 10 „ „ „	1	6	8
Major	1	11	2
Major, after 15 years' total service	1	15	8
„ „ 18 „ „ „	1	17	10
„ „ 20 „ „ „	2	2	4
Lieutenant-Colonel	2	9	0
Lieutenant-Colonel after 3 years' service as such	2	13	4
Colonel	3	0	0

CHARGE PAY

The officer in charge of the Dental Laboratories, Aldershot, receives charge pay at the rate of 5*s.* a day if holding the rank of Captain, or 2*s.* 6*d.* a day if holding the rank of Major.

ALLOWANCES

The allowances for officers of the Army Dental Corps are at the same rates as for officers of the Royal Army Medical Corps.

RETIREMENT AND RETIRED PAY OR GRATUITY

(1) The rates of retired pay will be the same as for officers of the Royal Army Medical Corps.

(2) Voluntary retirement on retired pay will not be allowed until after twenty years' service.

(3) Earlier retirement on gratuity may be allowed:—

After 8½ years'	service as a Dental Officer,	gratuity of £1000.
„ 15 „		„ £2000.
„ 18 „		„ £3000.

The aim of the Corps is the prevention of wastage on account of dental disease or dental deficiency, and, to enable this to be carried out, every recruit is inspected by a dental officer immediately after joining and all necessary treatment carried out. The soldier is reinspected at least once a year and the dental efficiency maintained at the best standard possible.

INDIAN MEDICAL SERVICE

THIS Service shares in the general conditions of change to which the whole of Indian State and civil affairs are at the present being subjected. While it is the view of many senior officers that the period of depression is passing, the grounds on which this view is held would be challenged by many. The Service is, in fact, obtaining excellent recruits, of whom the Director-General remarked not long ago that they were to be envied in embarking on a great adventure in which the part played by the Service would be greater than it had ever been in the past. The India Office is now inviting applications for permanent commissions on very favourable terms to young members of the medical profession. These terms include a gratuity of £1000 on retirement after six years' service, or one of £2500 after 12 years' service, together with free return passages for those who no longer desire to remain in the Service. An announcement made by the India Office admits frankly that it is not possible to state at present what, if any, prospects of employment on the civil side will be open to I.M.S. officers under the proposed new constitution. We find it difficult to imagine the abolition of the civil side of the Service, having regard to past magnificent work and present urgent needs.

THE NEW REGULATIONS

Competitive examination remains suspended for the present and admission to the Service is on written application to the India Office. As sound bodily health is a first essential candidates may, if they wish it, undergo a preliminary examination by a Medical Board which meets weekly at the India Office.

Candidates must be under 32 years of age at the time of application, and must possess a qualification registered in Great Britain and Northern Ireland, *under the Medical Acts in force at the time of appointment.* Arising out of the recommendations of the Lee Commission the Secretary of State for India in Council after consultation with the Government of India has decided that the Indian Medical Service constituted on the same broad lines as in the past shall be retained primarily to meet the needs of the Indian Army. In order to maintain the necessary minimum war reserve of military medical officers, and to provide for European medical attendance for European officers of the Superior Civil Services and their families, local governments will be required to *employ a stated number of Indian Medical Service* officers. The Government of India will draw on the same Service to meet the requirements of the civil administration for which they are responsible. For *the present 237 such posts have been reserved, and* including the leave reserve will provide employment for 302 officers; 212 of these officers will be British medical men and 90 Indians. As the proportion of *European to Indian civil officers diminishes these* figures will be subject to periodical scrutiny, and, if necessary, to revision. It will be a definite condition of service for all future entrants to the Service that *they will be liable to serve on either the civil or the* military side. All officers are required to perform one year's military duty subsequent to permanent appointment before they can be considered eligible *for civil employment. Executive medical officers in* both civil and military employment may attend persons unconnected with Government service provided their duty admits of it. On the military side, however, *the opportunities for private practice are* not great. Service during the war as a medical or combatant officer, or in a position usually filled by an officer, counts towards promotion and pension, *and the commissions of officers who before appointment* have obtained certain higher qualifications or have held resident appointments in certain hospitals may be antedated by one year.

RATES OF PAY

The monthly rates of pay for European officers of non-Asiatic domicile in the Service are as tabulated below. The rupee, it may be remembered, has now been definitely stabilised at 1*s.* 6*d.*

Rank and service in rank.	Basic pay.	*Over-seas pay.*	*Year of total service.*
	Rs.	Rs.	
Lieut.	500	150	First
		150	Second
		150	Third
Captain:—			
1. During first three years' service as Captain.	650	150	Fourth
		£15	Fifth
		£15	Sixth
2. With more than three and less than six years' service as Captain.	750	£25	Seventh
		£25	Eighth
		£25	Ninth
3. *With more than six* years' service as Captain.	850	£25	*Tenth*
		£25	Eleventh
		£30	Twelfth
Major:—			
1. During first three years' service as Major	950	£30	Thirteenth *and over*
2. With more than three and less than six years' service as Major	1100		
3. With more than six years' service as Major	1250		
Lieut.-Colonel:—			
1. Until completion of *23 years' total service*	1500		
2. During twenty-fourth and twenty-fifth years' total service	1600		
3. After completion of 25 years' total service	1700		
4. When selected for increased pay ..	1850		

NOTE TO TABLE

Until the completion of 23 years' total service basic pay is regulated according to rank and service in rank (column 1) which, owing to the system of accelerated promotion, may be in advance of the time-scale of promotion. Overseas pay is regulated solely with reference to length of total service (column 4). *In addition to the above rates various allowances* are admissible for a large number of special appointments on both the military and the civil side which may be held by members of the I.M.S. Special high rates of pay are also attached to the numerous administrative appointments open to officers in both branches of the Service. The appointment of Director-General, I.M.S., which is held by an I.M.S. officer, carries pay of Rs.3500 per mensem. The appointment of Director of Medical Services in India, carrying pay at Rs.3200 per mensem, may also be held by an officer of the Indian Medical Service.

Owing to the state of financial emergency prevailing in India, the existing monthly rates of pay and allowances are at present subject to a temporary reduction of 5 per cent.

Initial rates of pay are based on the assumption that the majority of newly appointed officers will be bachelors. Officers on arrival in India will be posted for one year to specially selected stations. Officers in military employment, when in command or second-in-command of the larger station hospitals, receive special allowances. On the civil side there are public health, bacteriological, research, and professorial appointments carrying special enhanced rates. Officers on appointment receive an outfit allowance of £50.

PENSIONS AND ALLOWANCES

The rates of pensions are as shown in the table below.

Service.	Rates per annum.	Service.	Rates per annum.
After 17 years ..	£400	After 23 years ..	£620
„ 18 „ ..	430	„ 24 „ ..	660
„ 19 „ ..	460	„ 25 „ ..	700
„ 20 „ ..	500	„ 26 „ ..	750
„ 21 „ ..	540	„ 27 „ ..	800
„ 22 „ ..	580		

The above rates are subject to periodical revision upwards or downwards, to an extent not exceeding 20 per cent. in all, on account of a rise or fall in the cost of living, as compared with the year 1919. A deduction of 8¼ per cent. is at present being made on this account.

There are additional pensions not subject to the above reduction ranging from £65 to £350 per annum *for officers who have held high administrative* appointments as colonels or major-generals.

Officers on appointment are provided with free passage to India, normally by transport. The wives and families of officers who are married prior to the date of the officers' embarkation on first appointment will also be given free passage to India subject to the payment of messing charges. Officers are granted a certain number of return passages home at Government expense during their career. There are special allowances for officers whilst on study leave.

Further particulars can be obtained on application *to the Secretary,* Military Department, India Office, Whitehall, London, S.W.1. Letters should be marked "Recruitment for I.M.S."

SWISS M.D. DEGREES FOR FOREIGNERS.—The Universities of Basle, Berne, and Zurich grant the degree of M.D. to medically qualified foreigners under the following conditions:—Candidates are required to present an acceptable thesis and to pass a special final examination. Fee 400 Swiss francs (£20). Information on application to the dean of the medical faculty of each university. At Lausanne the doctorate in medicine can be obtained on the completion *of one academic year of study (October–July) in the faculty* of medicine, followed by examination and the presentation of a thesis bearing on the year's study, the laboratory course being chosen in relation to the subject of the intended thesis. The candidate should make written application to the dean of the *faculty of medicine, and further information* can be obtained in this country from the hon. secretary of the Lausanne Medical Graduates (Kwato, 23, Liskeard-gardens, Blackheath, S.E.3). The M.D. of Geneva is conferred under similar conditions as in Lausanne.

AIR FORCE MEDICAL SERVICE

THE Air Council attach great importance to attracting into the service the best type of medical man, since on the capacity of the Medical Service depends in a peculiar degree the safety and efficiency of the Air Force. The duties of a medical officer in the Air Force include not only the prevention and treatment of those ordinary diseases to which the personnel of any fighting service are liable, but the special study of the mental and physical stresses imposed on the airman in diverse circumstances and climates—a new branch of medicine which still provides considerable scope for research.

As promotion to the higher ranks of the Service is by selection from officers who are eligible by reason of length of service, and as a certain proportion of the higher ranks are reserved for purely professional as opposed to administrative appointments, it will be seen that there are excellent prospects for the young medical officer who exhibits ability and energy in his professional work.

The work to be done, therefore, has a high professional interest, combined with good rates of pay and allowances, so that a career is offered which should prove both attractive and interesting. The life is one which is certain to appeal to the man of wide outlook who desires opportunities for travel, sport, and games, and can find interest and enjoyment in aviation.

His duties will, as a matter of course, give him flying experience as a passenger, which is necessary for the proper study of the medical problems of aviation and for gaining first-hand knowledge of the conditions under which his comrades serve.

The establishment consists partly of permanent and partly of short-service officers, and an officer on entry is granted a short-service commission for a period of three years on the active list (which may be extended to five years at the discretion of the Air Council, if the officer so wishes, on the recommendation of the Director of Medical Services) and of four years in the Reserve of Air Force Officers. Selections for permanent commissions are made from officers holding short-service commissions, and those who are not selected are transferred to the Reserve at the expiration of their period of service on the active list.

For those entrants who desire it the prospect of obtaining a permanent commission is approximately an even one, and experience has so far shown that the officers selected have included the great majority of those desirous of, and suitable for, retention in the Service. But the short-service commission with its gratuity after three or five years is in itself an attraction to many entrants who desire to enlarge their experience and outlook from the point of view of subsequently entering private practice, and who, on entry, have not made up their minds to the adoption of a permanent career in the Service.

For certain purposes medical officers may be allowed to count as service their time spent in approved whole-time post-graduate appointments in civil hospitals under certain well-defined and generous conditions.

Officers who have been selected for permanent commissions may be permitted to attend for a period not exceeding nine months a post-graduate course in general medicine and surgery, tropical and preventive medicine, and other special subjects. Such permission may be granted at any time when the exigencies of the Service permit during the first 16 years of service, and when attending these courses officers will receive full pay and allowances.

New entrants into the Royal Air Force Medical Service are commissioned as Flying Officers (Medical), and are eligible for promotion to the rank of Flight Lieutenant (Medical) after two years' service. Officers selected for permanent commissions are normally promoted to the rank of Squadron Leader after ten years' total service. Accelerated promotion may be granted in a limited number of cases to officers who show exceptional ability after the completion of eight years' service. Promotion within establishment to the rank of Wing Commander is by selection at any period after 16 years' total service, and to that of Group Captain by selection at any period after 22 years' service.

Certain posts in these ranks are reserved for officers fully employed in professional work, such as surgery, pathology, ophthalmology, &c., numbering at present six in all. The number of these posts will be limited only by the needs of the service and by the necessity of observing a similar proportion between the number of reserved posts and the officers from whom they can be filled, as exists between the total number of higher ranks and the remainder of the medical service. Selections for these reserved posts will be made only from officers professionally qualified to hold them. Officers filling the reserved posts will be eligible for selection to the administrative appointments of their rank, and to the highest administrative appointments.

There is no competitive examination on entry; candidates must be under 28 years of age, British subjects, the sons of British subjects, and of pure European descent, and are interviewed by a Board presided over by the Director of Medical Services, Royal Air Force, before acceptance. Each candidate must produce:—

1. Birth certificate. 2. Medical registration certificate. 3. A declaration containing the following information: (*a*) Age and place of birth. (*b*) That he is a British subject, the son of British subjects, and of pure European descent. (*c*) That he is ready to engage for general service at home or abroad as required. (*d*) The qualifications he is possessed of, and what medical or other appointments he has held (if any). (*e*) That he is willing to fly as a passenger whenever called upon to do so.

Each candidate is required, before acceptance, to pass a medical examination to ensure that he labours under no constitutional or mental disease or weakness, nor any imperfection or disability which may interfere with the efficient discharge of the duties of a medical officer in any climate, in peace or war.

On appointment entrants undergo an initial course of eight weeks, during which they are given instruction in the special medical aspects of aviation, the organisation and administration of the Royal Air Force, and the general and special duties to be performed by officers in the Medical Branch.

In order to avoid the necessity for further examinations the position of entrants in order of seniority in the Air Force List is determined at the end of the initial course by a system of marking and reports on the actual work done during their instruction.

UNIFORM AND EQUIPMENT

Medical officers are required to provide themselves with the uniform, service dress, and mess dress of their rank, and with the distinguishing badges of the Royal Air Force Medical Branch. The provision of full dress is entirely optional at present. An allowance of £50 towards the cost of uniform is made on joining to candidates who have not had previous commissioned service in H.M. Forces.

EMOLUMENTS

The emoluments of medical officers of the Royal Air Force are given in outline below. The rates of pay are fixed on an inclusive basis, and the fact that specialist pay and charge pay are not payable as separate emoluments was taken into account when the rates were fixed. The standard rates of pay and retired pay were fixed on the basis of the high cost of living in 1919, and 20 per cent. of each standard rate is detachable and subject to alteration in relation to the cost of living. The current rates represent a reduction of approximately 11 per cent. on the standard rates. Unless a material and sustained variation in the cost of living occurs, these rates will, subject always to the overriding consideration of the national financial position, remain in force until March 31st, 1934.

ROYAL AIR FORCE MEDICAL BRANCH: RATES OF PAY AND ALLOWANCES

Rank.	Pay.* Daily rates. Standard.	Pay.* Daily rates. Current.	Pay.* Per annum (current rate).	Cash allowances at home rates in lieu of quarters, rations, and servant, if not available in kind (per annum).† Married.	Cash allowances … Unmarried.	Pay plus allowances per annum. Married.	Pay plus allowances per annum. Unmarried.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Flying Officer	1 4 0	1 1 4	389 6 8	190 2 1	117 2 1	579 8 9	506 8 9
Flight Lieutenant— ..	1 6 0	1 3 2	422 15 10	228 2 6	117 2 1	650 18 4	539 17 11
After 2 years as such ..	1 8 0	1 5 0	456 5 0	228 2 6	117 2 1	684 7 6	573 7 1
After 4 years as such ..	1 10 0	1 6 8	486 13 4	228 2 6	117 2 1	714 15 10	603 15 5
Squadron Leader— ..	1 14 0	1 10 4	553 11 8	231 3 4	155 2 6	784 15 0	708 14 2
After 2 years as such ..	1 18 0	1 13 10	617 9 2	231 3 4	155 2 6	848 12 6	772 11 8
After 4 years as such ..	2 0 0	1 15 8	650 18 4	231 3 4	155 2 6	882 1 8	806 0 10
After 6 years as such ..	2 4 0	1 19 2	714 15 10	231 3 4	155 2 6	945 19 2	869 18 4
After 8 years as such ..	2 8 0	2 2 8	778 13 4	231 3 4	155 2 6	1009 16 8	933 15 10
After 10 years as such ..	2 10 0	2 4 6	812 2 6	231 3 4	155 2 6	1043 5 10	967 5 0
Wing Commander— ..	2 15 0	2 9 0	894 5 0	232 13 9	185 10 10	1126 18 9	1079 15 10
After 2 years as such ..	2 17 0	2 10 8	924 13 4	232 13 9	185 10 10	1157 7 1	1110 4 2
After 4 years as such ..	3 3 0	2 16 0	1022 0 0	232 13 9	185 10 10	1254 13 9	1207 10 10
Group Captain	3 10 0	3 2 4	1137 11 8	304 3 4	246 7 6	1441 15 0	1383 19 2
Air Commodore	4 0 0	3 11 2	1298 15 10	360 8 9	307 4 2	1659 4 7	1606 0 0
Air Vice-Marshal	5 0 0	4 9 0	1624 5 0	424 6 3	368 0 10	2048 11 3	1992 5 10

* Except for periods of service under Indian administration. For such periods officers receive pay and allowances at rates and subject to conditions authorised from time to time by the Government of India.

† These allowances are issued only when accommodation, fuel and light, rations, and personal attendance are not available in kind. Normally, provision in kind is available for junior officers. "Married" rates of allowances are payable only to married officers who have reached the age of 30 or the rank of Squadron Leader. The rates and general scheme of allowances are liable to revision as circumstances may require.

ALLOWANCES AT STATIONS ABROAD

In addition to the current pay shown above, officers stationed abroad are provided with furnished quarters (with fuel and light) and rations, or allowances in lieu, and receive colonial and servant allowances. The present total of the allowances (including colonial and servant allowances) payable when provision in kind is not available is as follows :—

	Egypt		Palestine		Malta		Malaya	
	M.	S.	M.	S.	M.	S.	M.	S.
	p.a. £	p.a. £	p.a. £	p.a. £	p.a. £	p.a. £	p.a. £	p.a. £
Flying Officer ..	435	222	438	228	277	133	627	274
Flight Lieutenant ..	435	222	455	228	277	133	627	274
Squadron Leader ..	435	275	455	281	277	149	627	301
Wing Commander ..	537	329	549	344	319	163	698	401
Group Captain ..	573	366	599	385	356	200	722	427

M. = married ; S. = single.

The married rates are payable only when the officer is accompanied by his family. If unaccompanied he is treated as unmarried for the purposes of his own accommodation, or allowances in lieu, and receives a consolidated allowance in respect of the separated family as follows :—

Flying Officer	£109 p.a.
Flight Lieut. and Squadron Leader ..	£136 ,,
Wing Cmdr. and Group Captain ..	£173 ,,

Iraq and Sudan.—Families are normally not allowed in these countries, and officers are provided with accommodation, &c., for themselves, and receive colonial and servant allowances. The present rates of colonial allowance amount to £142 p.a. (Iraq) and £55 p.a. (Sudan). In addition, married officers receive the consolidated allowance for separated families at the rates shown above.

Aden and Transjordan.—Families are only allowed at these stations if public married quarters are available. Married officers accompanied by their families are accordingly provided with married accommodation, &c., and receive a servant allowance of 2*s.* a day and a colonial allowance of 10*s.* a day at Aden and 7*s.* in Transjordan. All other officers are provided with unmarried accommodation and receive servant allowance of 2*s.* a day and colonial allowance of 5*s.* a day at Aden and 3*s.* 3*d.* a day in Transjordan. In addition, married officers separated from their families receive the consolidated allowance at the rates shown above.

Retired Pay

The minimum period of service qualifying for retirement on retired pay is 20 years.

Standard scales of retired pay are as follows :—

AIR OFFICERS

Air Vice-Marshal	£790 to £1010 per annum.
Air Commodore	£650 ,, £950 ,, ,,

OFFICERS BELOW AIR RANK

Age on retirement.	Standard yearly rate of retired pay.	Years of service.	Addition for each extra year of service.*	Deduction for each deficient year of service.*
	£		£	£
40	300	17	15	15
41	337	17	15	15
42	375	18	15	15
43	412	18	15	15
44	450	19	15	15
45	487	19	15	15
46	525	20	15	15
47	562	20	15	15
48	600	21	15	15
49	637	21	15	15
50	675	22	15	15
51	697	22	22	15
52	720	23	22	15
53	742	23	22	15
54	765	24	22	15
55	790	24	22	15

* Limited to five years.

The maximum standard rates of retired pay and the compulsory retiring ages for the several ranks are :—

Rank.	Yearly rate of retired pay.	Compulsory retiring age.
	£	
Air Vice-Marshal ..	1010	60
Air Commodore ..	950	57
Group Captain.. ..	900	55
Wing Commander ..	600	51
Squadron Leader ..	500	48

Gratuities.—A permanent officer allowed to retire before having qualified for retired pay may be granted a gratuity provided he has not less than ten years' commissioned service, namely :—

£1500 if he has 10 but less than 15 years' commissioned service.
£2500 ,, ,, 15 or more than 15 ,, ,, ,,

Short-service officers will be eligible on passing to the Reserve for gratuities on the following scale: £100 for each of the first two complete years of service, £150 for each of the third and fourth complete years, and £200 for the fifth complete year; that is:—

For three years' service on the active list ..	£350
For five ,, ,, ,, ,, ,, ..	£700

These gratuities will not be payable to officers granted permanent commissions, but their service on a short-service commission will count towards retired pay.

COLONIAL MEDICAL SERVICE

THE various Colonial government medical departments employ some 1200 European medical officers and about the same number of qualified Asiatic and African medical officers who are appointed locally. Included in this total are about 60 qualified European women medical officers. About 850 trained nursing sisters and health visitors are employed, most of whom are Europeans. There are large numbers of subordinate personnel, sanitary inspectors, medical assistants, and dressers, most of whom are natives of the areas in which they serve.

Throughout nearly the whole of the Colonial Empire such diseases as malaria, yaws, leprosy, and hookworm disease menace the health of the indigenous people and retard the progress of development. In equatorial Africa sleeping sickness and plague persist, in West Africa yellow fever has not yet been eradicated, and in the Near and Far East outbreaks of cholera and plague occur from time to time. But in addition to tropical diseases, those maladies usually met with in this country are prevalent throughout the Empire.

An officer in the Colonial Medical Service thus has unique opportunities for the practice of his profession. On joining his medical department his duties include medical, surgical, and public health work. He may be posted to an outlying or bush station where he will be responsible for all the medical activities in connexion therewith; or he may be attached for duty at one of the large hospitals. Every encouragement will be given him to pursue any specialist work in which he may be interested in so far as the exigencies of the service permit. Great importance is attached to a candidate's post-graduate experience, as in the outlying districts he will frequently be called on to deal with emergencies without being able to seek the advice and assistance of his colleagues.

VACANCIES

Vacancies for medical officers may occur at any time of the year, and are dealt with as circumstances require. The almost complete cessation of recruitment during the war period, coupled with the post-war expansion of staffs, particularly in the larger Colonies, resulted in an abnormally high rate of recruitment. The average for the six years, 1924 to 1929, was 104 vacancies per annum. In 1930 the number of vacancies fell to 77, due to the establishments of medical departments being almost at full strength. As a result of the general financial depression, only 35 vacancies were filled in 1931 and the number was further reduced to 12 in 1932. For the present, therefore, vacancies are likely to be very infrequent. In normal circumstances vacancies occur most frequently and regularly in Tropical Africa and Malaya. The vacancies for which candidates are selected from outside the service are those for ordinary medical officers. Appointments for specialists are almost invariably reserved for officers who are already in the Service, and who have shown outstanding merit in a particular branch of medicine or surgery. Under normal conditions about six vacancies may be expected annually, usually in West Africa and in Malaya, for women medical officers.

QUALIFICATIONS

Applicants must be under 35 years of age, and preference is given to candidates under 30. For certain appointments candidates must be of European parentage.

Preference will be given to applicants who have held hospital or public health appointments or who have special knowledge of anæsthetics, radiology, surgery, medicine, ophthalmology, gynæcology and midwifery, diseases of the ear, nose, and throat, or venereal diseases. In the case of women medical officers experience in maternity and child welfare is almost essential.

Selected candidates will normally be required to undergo a course of instruction at the London School of Hygiene and Tropical Medicine or at the Liverpool School of Tropical Medicine or at Edinburgh University, before taking up his appointment. The cost of tuition will be paid by the Government, but candidates must make their own arrangements for board and lodging. An allowance of £25 a month will be paid to them monthly in arrear while they are under instruction. Candidates who are successful in obtaining the diploma in tropical medicine and hygiene of London, Liverpool, or Edinburgh are granted a refund of their examination fees. If an officer has not taken a course of instruction in tropical medicine prior to appointment, he is usually required to take one during his first leave of absence and to obtain a satisfactory certificate before he can be confirmed in his appointment.

GENERAL CONDITIONS OF SERVICE

In view of the present financial stringency it has been found necessary in certain Colonial Administrations to impose a temporary levy on salaries. The actual value of an appointment is often much greater than is indicated by the salary alone. An applicant should take into consideration whether the post is pensionable; whether free quarters are provided; whether any special local allowances are payable; whether free passages are provided on first appointment and when proceeding on leave; and whether free or assisted passages are provided for the wives and children of married officers. If local income-tax exists in a colony it is much lower than that payable at home.

While each dependency has its own establishment, the higher posts are normally filled by selection from the Colonial Service generally, any member of which is eligible for vacancies in dependencies other than the one in which he is serving. But transfers from one colony to another are unusual during the early years of an officer's career.

The majority of appointments are pensionable. Officers appointed to pensionable posts serve on probation in the first instance, the probationary period varying in different services—e.g., two years in East Africa, three years in West Africa. Some appointments are temporary, and service in these does not qualify for pension unless the appointment is subsequently made pensionable.

Information as to the conditions and cost of living in the colonies, protectorates, and mandated territories is contained in a publication of that title (Colonial No. 56), which may be obtained from H.M. Stationery Office, price 3s. Further information as to the staffs, the climate, and local conditions will be found in Appendix III. of the Dominions Office and Colonial Office List, which also contains the rules as to leave of absence, free passages, &c. Leaflets concerning nearly all the tropical dependencies are issued for the use of intending settlers and others by the Oversea Settlement Department, Dominions Office, Caxton House, Tothill-street, London, S.W.1. A memorandum on Medical Appointments issued by the Colonial Office will be sent without charge on application to the Director of Recruitment.

Applications for medical appointments in the Colonial Service should be addressed to the Director of Recruitment (Colonial Service), Colonial Office, 2, Richmond-terrace, Whitehall, London, S.W.1. For the present no candidate will be considered by the Secretary of State for the Colonies who did not —if of suitable age—serve in some branch of His

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Majesty's Forces during the Great War, unless his reasons for not having done so are considered entirely satisfactory by the Secretary of State.

APPOINTMENTS FILLED BY THE SECRETARY OF STATE FOR THE COLONIES

The medical appointments at the disposal of the Secretary of State for the Colonies are confined to those colonies, protectorates, and dependencies which are administered under his directions. They are here classified under the headings (*a*) Tropical Africa, (*b*) Eastern Colonies and Protectorates, (*c*) West Indian Colonies, (*d*) Western Pacific, (*e*) Mediterranean Colonies, (*f*) an Island Group, (*g*) Middle East. In Ceylon, Mauritius, Jamaica, Barbados, the Bahamas, and Bermuda vacancies are practically always filled locally by the appointment of qualified candidates, or in the case of some of the higher posts, by transfer from other colonies. Appointments in Malta are all filled locally. Each colony or protectorate has its own separate medical establishment, but there are grouped services in East and West Africa and in Malaya. Although individual wishes are consulted, officers are liable to be posted or transferred to any of the dependencies within such a grouped service.

Tropical Africa

EAST AFRICAN MEDICAL SERVICE

The medical staffs of Kenya, Uganda, Nyasaland, Somaliland, Zanzibar, and the Tanganyika Territory form one service (Northern Rhodesia has its separate establishment), the members of which are liable to be posted or transferred to any of the Dependencies as the exigencies of the service may require. The preferences of individual officers are, however, taken into consideration as far as possible. Selected candidates are appointed as medical officers on probation in the first instance for two years, at the end of which period their appointments are made permanent if their service has been satisfactory, and a native language test has been passed. Later on a special course of study must be taken while on leave. Candidates can generally take their wives with them on first appointment. Medical officers (but not health officers) are permitted to take private practice at some stations on the understanding that they give precedence to their official duties. It must be understood that additions to their income from this source are not likely to be substantial, and that the privilege is liable to withdrawal at any time.

Officers are provided with quarters free of rent or the Government may provide temporary accommodation, or an allowance in lieu of quarters may be paid. The salary of a medical or sanitation officer is £600 per annum, rising by annual increments of £30 to £840, and thence by increments of £40 to £920, subject to an efficiency bar at £840. Senior medical officers and senior sanitation officers are paid on the scale £1000 by annual increments of £50 to £1100. Officers who possess the Diploma in Public Health on entering, or who acquire it while in the Service, receive two special increments in the scale.

Officers of the East African Medical Service are permitted to retire with gratuity, if they wish, instead of waiting to retire on pension as follows: (*a*) After nine years' service, of which at least six must have been spent in East Africa, £1000; (*b*) after 12 years' service, of which at least eight must have been spent in East Africa, £1250. If an officer elects to retire with gratuity he thereby forgoes all claim to pension.

The highest grades and salaries in the medical departments are as follows:—

Kenya.—Director of Medical and Sanitary Services, £1500; Deputy Director of Medical Service, £1200; Deputy Director of Sanitary Service, £1200; Deputy Director of Laboratory Service, £1200.

Uganda.—As Kenya.

Tanganyika Territory.—As Kenya.

Nyasaland.—Director, £1300; Medical Entomologist, £1000–£50–£1100.

Zanzibar.—Director, £1400; Deputy Director of Sanitary Service, £1200; Resident Surgical Officer, £1000–£50–£1100.

Northern Rhodesia.—Director, £1300; Deputy Director, £1200.

There are also the following posts: medical superintendent and principal of medical school, Mulago Hospital (Uganda), £1150; sleeping sickness officer (Tanganyika Territory), £1000–£50–£1100; senior bacteriologists (Kenya and Uganda), £1000–£50–£1100. Health officers are selected from the ranks of medical officers as occasion arises.

Leave and Passages.—The normal tour of service is 20 to 30 months (less in Somaliland), after which leave is granted with full salary to an amount of six days for each completed month of residence (or three days when for any reason the officer is not returning to East Africa), exclusive of the periods of the voyages to and fro. Extensions of leave with full salary are given in case of sickness or in the case of officers attending approved courses of instruction. In addition to the above, local leave may be granted up to 14 days a year. Officers serving in Northern Rhodesia are allowed four (or two) days' leave in respect of each month of service.

Free *first-class* passages are provided for the officer on first appointment and on leave, and in certain cases assistance towards family passages is given.

Pensions.—Officers on the pensionable establishment may retire (or be retired by the Government) on attaining the age of 50 years; but they may be retained in the service, with their own consent, for such further period as the Government may recommend. Earlier retirement in the event of ill-health is also provided for. Pension is computed at one-four hundred and eightieth of pensionable emoluments—i.e., salary and value of free quarters in respect of each month's pensionable service—at the time of retirement, subject to an average of emoluments for the last three years before retirement. For instance, an officer of 25 years' service who has reached the maximum of the long scale receives a pension of about £650.

WEST AFRICAN MEDICAL STAFF

This service consists of the qualified European male personnel of the medical department of the Gambia, Sierra Leone, the Gold Coast (including Ashanti, the Northern Territories, and British Togoland), and Nigeria (Southern and Northern Provinces, and the British Cameroons).

Officers hold their appointments in the first instance on probation for three years from the date of their first arrival. After passing a language test and being placed on the permanent establishment this period is counted for pension. Officers are not allowed to take their wives and young children out with them without the sanction of the Governor. When, as is usually the case, an officer has obtained permission to be accompanied by his wife a grant of one-half the cost of his wife's passage to and from West Africa is made subject to certain conditions.

Candidates may express a preference for any particular Colony, and their wishes in this respect will be borne in mind and met as far as possible, but they are liable to be posted in the first instance, or transferred afterwards if necessary to any other West African Colony at the discretion of the Secretary of State. Transfers from one Colony to another are made as seldom as possible, and those transferred do not forfeit their claim to pension.

Leave.—European officers in West Africa may be granted vacation leave on full salary not exceeding in all one week's leave in the United Kingdom for every completed calendar month of total residential service in West Africa, plus the time necessarily taken on the journey to the United Kingdom, and, if the officer is returning to West Africa for further service, the time necessarily taken on the journey from the United Kingdom to the Colony. Vacation leave may be granted without any special grounds after 18 consecutive calendar months of residential service in West Africa. An officer will not be required to serve a tour of more than 24 consecutive calendar months' residential service except in special circumstances; and the Governor may grant vacation leave to any officer at any time after he has completed 12 consecutive calendar months' residential service. Within the above limits, the actual length of each officer's tour will be at the discretion of the Governor. Vacation leave on full salary may also be granted to an officer if he is invalided from West Africa after less than 12 consecutive calendar months' residential service, and sick leave on full salary may be granted for any period not exceeding six calendar months. In addition, local leave may be granted up to 27 days in any one tour.

Appointments and Salaries.—Medical officers for the West African colonies and protectorates are on one list for employment and promotion. The grades and emoluments of the staff in Nigeria are at present as follows:—

Appointment.	Salary.	Remarks.
1 Director of Medical and Sanitary Service.	£1800	Duty allowance £360.
1 Deputy Director, Health Service.	£1500	Duty allowance £300.
1 Assistant Director of Medical and Health Service.	£1400	Duty allowance £280.
2 Specialist Officers ..	£1300	Duty allowance £260. After five years' approved service the Deputy Director is eligible for a salary of £1400 with duty allowance £280.
1 Assistant Director of Medical Service.	£1300	Duty allowance £260.
1 Assistant Director of Health Service.		
1 Director, Tsetse Investigation.	£1200	Staff pay £300.
5 Senior Health Officers ..	£1050–£50–£1200	Duty allowance £210.
11 Senior Medical Officers	£1000–£50–£1150	Seniority allowance £100.
1 Deputy Director, Tsetse Investigation.	£800–£40–£960	Staff pay £150; Seniority allowance £72.
1 Senior Sleeping Sickness Officer.		
1 Research Medical Officer		
1 Superintendent, Dispensers' Training School.		
11 Pathologists	£660–£30–£720–£40–£960	—
13 Medical Officers of Health.		
97 Medical Officers ..		
3 Lady Medical Officers ..		

The highest grades and salaries in the other medical departments are as follows:—

The Gambia.—Senior Medical Officer, £1000–£50–£1150.

Sierra Leone.—Director. £1400; Surgical Specialist, £1300; Assistant Director of Health Service, £1300.

The Gold Coast.—Director, £1600; Deputy Director of Medical Service, £1400; Deputy Director of Health Service, £1400; three Specialist Officers (two surgical, one medical), £1300; Assistant Director of Medical Service, £1300.

The number of specialist appointments is not fixed, officers of outstanding professional merit being eligible for them. There are 20 appointments of the grade of senior medical officer, and eight of senior health officer. Possession of the diploma in public health is usually required for appointment to the latter grade. Special facilities are granted to study for the diploma during leave. There are at present 29 appointments as medical officer of health. The salary scale is the same as that of medical officers, except that medical officers of health are granted an initial salary at the rate of £800 a year, together with seniority allowance at the rate of £72 a year and staff pay at the rate of £150 a year, half of which is payable during leave. After three years' service on the maximum of the scale, viz., £960 a year, and on undergoing an approved course of study, medical officers of health are eligible, if unpromoted, subject to the recommendation of the Governor, to be placed on the scale £1000 a year rising by annual increments of £50 to £1150 a year, together with seniority allowance at the rate of £100 a year and staff pay as before. The holders of these appointments are not allowed private practice. Candidates must obtain a diploma in tropical medicine and hygiene, or be in possession of a diploma in public health. They are appointed subject to the condition that, if after a period they are considered unsuitable to serve in that capacity, they may be called upon to transfer to the medical side. The salary of medical officer is at the rate of £660 a year, rising by annual increments of £30 to £720 a year. Then, if confirmed in the appointment, £720 a year, rising by annual increments of £40 to £960, with seniority allowance at the rate of £72 a year. Before passing £800, medical officers are required to take a special course of study for three months. If they obtain satisfactory certificates at the end of the course they draw their further increments up to £960 a year. A medical officer who has served for three years on the maximum salary of this scale (£960) without obtaining promotion is eligible, if recommended by the Governor, to be placed on the scale £1000–£50–£1150, with £100 seniority allowance (as for senior medical officers).

Research and Pathology.—There are a number of appointments for pathologists in Nigeria and the Gold Coast. The salary and other conditions attached to these posts are similar to those of medical officers of health.

All officers of the staff, except directors, deputy directors, assistant directors, senior health officers, medical officers of health, research officers, and a few other officers holding special appointments, are at present allowed to take private practice, provided that it does not interfere with the faithful and efficient performance of their official duties, but it is within the power of the Governor to withdraw or suspend the privilege in such places and for such periods as he may consider desirable. Private practice does not exist at many stations, and no guarantee can be given that an officer will be posted to a station in which he will be able to practise privately. As a general rule, and subject to the exigencies of the service, stations where there is private practice are allocated to senior members of the Staff.

African Medical Officers.—In addition to the membership of the West African Medical Staff, which is limited to British subjects of European parentage, there are a number of Government appointments for African medical officers in the West African Colonies. These appointments carry a salary on the scale £500–£20–£600, and there is a higher scale, £600–£30–£720. In addition, in Nigeria and on the Gold Coast, arrangements have been made for the employment of a few young African medical men temporarily on the hospital staffs, with a view to appointment to the Government service later, if suitable. In such cases a salary of £400 a year is paid.

Eastern Colonies and Protectorates

MALAYAN MEDICAL SERVICE

The qualified European personnel of the medical departments of the Straits Settlements, the Federated Malay States (Perak, Selangor. Negri Sembilan, and Pahang), the Unfederated Malay States (Johore. Kedah, Perlis, Kelantan, Trengganu, and Brunei) form one service. Officers are liable to be posted or transferred to any of the territories, though they are generally posted in the first instance to the Straits Settlements or the Federated Malay States.

Medical officers are appointed on the following scale of salaries: £700, rising to £770 during three years' probation; then, if they are placed on the pensionable establishment, rising to £805, and thence by annual increments of £35 to £1120, with a strict efficiency bar at £840. Officers possessing the D.P.H. receive an additional allowance (non-pensionable) of £140.

Above the concluding figure of £1120 there are certain higher appointments, as follows: principal civil medical officer, Straits Settlements, and principal medical officer, Federated Malay States, £1680 each; director, Institute for Medical Research, Federated Malay States, and principal, King Edward VII. College of Medicine, Singapore, £1540 each; 12 posts at £1470; and 31 posts at £1190, rising annually by £42 to £1400. Salaries are paid in dollars at 2*s.* 4*d.*

Private practice by Government medical officers is not allowed, but consultation work with another practitioner is permitted. Information about general conditions in Malaya is obtainable from the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

Leave.—Eight months' full-pay leave is normally granted: (*a*) after a tour of four years' resident service during the first eight years of resident service; (*b*) after a tour of three years' resident service during the next six years of resident service; (*c*) after a tour of two and a half years' resident service after 14 years' resident service. Additional leave on half-pay may be granted on special grounds. Officers are provided with free passages on first appointment for themselves and their families (i.e., wife and children) up to five persons, inclusive of the officer. On completion of each full tour, free return passages are given to all officers (with wife and children under the age of 10).

HONG-KONG

Officers are appointed on probation for three years. A diploma of public health is required for appointment as a health officer. The present establishment of the medical department is: director of medical and sanitary services, £1500–£50–£1800; deputy director £1300–£50–£1400; senior medical officer and senior health officer, £1200–£40–£1280; malariologist, health officer of port, bacteriologist, each £920–£40–£1280; five health officers, £860–£40–£1220; second health officer of port, assistant bacteriologist, radiologist, each £860–£40–£1220; eight medical officers, £700–£40–£1180. The currency of Hong-Kong is based on the silver dollar. For purposes of local payment salaries fixed in sterling are converted into dollars at the current rate of exchange. If quarters are provided a rental of 7 per cent. on salary is charged. In certain instances a rent allowance is paid instead.

West Indian Colonies

Jamaica.—There are 44 district medical officers who, if on a whole-time basis, draw £600–£25–£800 with travelling allowance and unfurnished quarters or an allowance in lieu. The public hospital, Kingstown, has a staff of six, the senior medical officer drawing £700–£50–£800. The chief post in the colony is that of superintending medical officer, £1100–£50–£1200. Whole-time officers are not allowed private practice. The age for voluntary retirement is 60. Pension is reckoned at the rate of one-sixtieth of the retiring salary for each year of service.

Trinidad and Tobago.—In Trinidad and Tobago there are about 40 appointments. Government medical officers receive salary at the rate of £400 per annum, rising by annual increments of £25 to £600. An officer appointed to a district receives, in addition to his salary, a travelling allowance varying from £100 per annum in a normal district to £150 per annum, and is allowed private practice, for which there is good scope. Officers employed in institution work receive a duty allowance varying from £50 to £300. Medical officers having completed 10 years' resident service are pensionable at the age of 55.

Windward Islands (Grenada, St. Lucia, St. Vincent). There are over 25 appointments. The chief medical officer, Grenada, receives £750, and also an allowance of £50 as bacteriologist. The chief medical officer, St. Lucia, receives £600–£700 plus forage and subsistence allowances; the post is pensionable, but private practice is not allowed except as a consultant. The chief medical officer, St. Vincent, receives £500–£600, with free quarters valued at £40. Most of the remaining appointments are district appointments with the right to private practice attached; the salaries paid by Government are, in Grenada, on the scale £500–£600, in St. Lucia, £400–£500, in St. Vincent, £400–£450. The Governor has the power to transfer a medical officer from one island to another. Appointments are pensionable.

Leeward Islands (Antigua, St. Christopher and Nevis, Dominica, Montserrat, Virgin Islands).—The appointments are similar in number and character to those in the Windward Islands, and are pensionable. An officer when first sent out is not appointed to a particular island but to the service of the Leeward Islands, with a salary of £350, and is later appointed to a definite district at a salary varying from £312 to £400–£25–£450, and the Governor decides as to the district which is to be allotted to him. He is liable to be transferred at the Governor's discretion to any medical district in the Leeward Islands. The medical officers, except in St. Christopher and Nevis, receive fees for successful vaccinations, post-mortem examinations, evidence at courts of justice, and certificates of lunacy. They are also, as a rule, allowed private practice. The chief medical officer, St. Christopher and Nevis, receives £930 and a travelling allowance, but is not allowed private practice, except as a consultant.

British Guiana.—There are the following posts in the medical service of the colony: surgeon-general, £1000–£1200 per annum, with consulting practice; medical officer of health, £900; ophthalmologist, bacteriologist, pathologist, each £700: 37 medical officers at £500–£25–£700. Most of the senior posts in institutions carry duty allowances (varying from £50 to £300 per annum) and quarters.

British Honduras.—There are five assistant medical officers at a salary of £500–£25–£650. The principal draws £825–£25–£850, paid in dollars. Unless they already possess a diploma of public health, medical officers are liable to be required, before they join the colony, to undergo a course of instruction at a laboratory of public health or analogous institution. The appointments are pensionable.

In British Guiana, Jamaica, and Trinidad officers are allowed to accumulate full-pay leave (at the rate of six weeks for each year's service) up to six months, and no leave of absence may (except in very special circumstances) exceed six months in all unless the officer has served for five years or more without leave, in which case two months on half-pay may be taken in addition to six months' full-pay leave.

Western Pacific

Fiji.—The chief medical officer receives £1000–£50–£1100, with free unfurnished quarters; the medical superintendent, Colonial War Memorial Hospital, £800–£25–£1000, and free quarters; the medical superintendent, Leper Asylum, £700–£50–£950, with completely furnished quarters and one servant; the medical officer of health, £750–£25–£900, no quarters provided. There are 14 district medical officers who receive £500–£25–£725, with partly furnished quarters or £50 house allowance (at the option of the Government) and duty allowance of £50 per annum in districts where no private practice exists. In certain districts horse allowances or car allowances are granted. In others a medical officer is provided with a launch or boat. District medical officers are allowed private practice on the understanding that their official duties are not neglected. In four districts the medical officer is also district commissioner and receives an additional allowance of from £175 to £275 and free partly furnished quarters. In most districts there is private practice, the value of which has been estimated at from £100 to £600 a year.

Western Pacific.—The staff in the British Solomon Islands Protectorate consists of a senior medical officer (£650–£50–£750), two district medical officers and one travelling medical officer (£550–£25–£650), with partly furnished quarters and a local allowance of £50, and a travelling allowance of £200.

In the Gilbert and Ellice Islands Colony there is a senior medical officer (£650–£25–£750), with partly furnished quarters, and one medical officer (£600–£25–£650), with partly furnished quarters or house allowance. There is hardly any private practice in the protectorate or colony.

Mediterranean Colonies

Cyprus.—There is a director of health (£1000–£25–£1200), and three district medical officers (£400–£20–£600), one of whom is allowed full private practice. The surgical specialist (£400–£20–£600) is allowed consulting practice.

Gibraltar.—There is a surgeon of the Colonial Hospital receiving £730, with private practice. There are also two assistant surgeons with a salary of £600 for 3 years and thereafter £650–£25–£700 per annum, who are allowed private consulting practice only. Free quarters, unfurnished, are provided for all three officers.

Island Group

Falkland Islands.—A colonial surgeon is paid at the rate of £800 per annum, with free furnished quarters, and £200 in lieu of private practice. His assistant receives £700–£25–£800, with quarters, and is not allowed private practice. The offices are pensionable.

Seychelles.—The chief medical officer receives £600 and the resident surgeon £487 10*s.* per annum, with quarters. There are three assistant medical officers, two receiving £487 10*s.*, the other £337 10*s.* per annum, paid in rupees. Private practice is allowed.

St. Helena.—The Colonial surgeon receives £550, with fees estimated at £27, and £30 horse allowance. Private practice is allowed.

Middle East

Palestine.—The grades and salaries of higher appointments in the department of health are: director, £1200, plus £200 expatriation allowance. Deputy director, £900–£50–£1100, plus £150 expatriation allowance. Assistant director (laboratories), specialist surgeon (who is allowed a certain amount of private practice), and five senior medical officers, £750–£25–£950, plus £100 expatriation allowance. One senior medical officer and Government analyst, £550–£25–£750, plus £100 expatriation allowance. Payment is in Palestinian pounds, now equal to sterling. The remainder of the staff is recruited locally. Three months' leave with full pay can be taken every two years. Most of the senior appointments have been or will be made pensionable.

APPOINTMENTS NOT WITHIN THE COLONIAL SERVICE

Appointments in the self-governing Dominions and the territories administered by them—viz., Canada, the Commonwealth of Australia (including Papua, Norfolk Island, and the mandated territory of New Guinea), New Zealand (including the Cook Islands and the mandated territory of Samoa), the Union of South Africa (including the mandated territory of South West Africa), the Irish Free State, and Newfoundland—are entirely under the control of the respective Dominion Governments. For information with regard to them application should be made to the High Commissioners or Agents-General in London.

Sudan Medical Service

This service is responsible for carrying out civil and military medical and public health duties in the Sudan.

The staff consists of: (*a*) A director. (*b*) A senior physician and a senior surgeon to the Khartoum Civil Hospital. (*c*) An assistant director. (*d*) Medical officer of health, Khartoum Province. (*e*) 34 British "senior medical inspectors" and "medical inspectors" whose pay commences at £E.720 and rises, subject to the recommendation of the director, by five biennial increases to £E.1080, and after 13 years' service to £E.1200. All rates of pay are subject to an abatement of 7½%. The senior medical inspectors are eligible, by selection, for the senior posts. All medical inspectors are appointed, in the first place, on probation for two years, and if at the end of that time they are accepted for permanent service under the Sudan Government, the first increase of pay is subject to their passing an examination in Arabic.

In addition to the above there are (*f*) a number of medical officers trained at one of the Syrian medical schools, and (*g*) Sudanese medical officers trained at the school of medicine at Khartoum. There are several native (*h*) assistant medical officers, who have been given a purely practical training in one of the larger hospitals in the Sudan.

Amongst the attractions of the service are: The great variety of the work met with among many different races of the Sudan; *leave* of 90 days, generally granted every year after the first 18 months of service; *study-leave*, which may be given for some definite purpose. The pension for medical inspectors who retire after 20 years' service is not less than £E.500 a year. If, however, he serves for a longer period, or is appointed to one of the higher posts, he will receive a larger pension. Private practice is allowed, but is limited to a few of the larger towns, and may be carried on so long as it does not interfere, in any way, with official duties. These duties include acting as consultant to the principal hospitals and the supervision of medical and public health work, the inspection of schools, the examination of candidates for Government service and pension, and the training of assistant medical officers and native sanitary overseers. The Khartoum Medical School is staffed mainly by members of the medical service, who receive additional remuneration for their work as teachers. A registrar of the medical school is also selected from the service, who receives £E.250 a year extra pay.

Inquiries for further information should be made to the Deans of the Principal Medical Schools, and to Dr. Hodson, 69, Harley-street, W.

Southern Rhodesia.—Appointments are under the control of the Government of Southern Rhodesia. Information from the High Commissioner, Crown House, Aldwych, London, W.C.2.

Malta.—Inquiries should be addressed to the secretary to the Head of Ministry, Malta.

North Borneo.—Application to the British North Borneo Company, 17, St. Helen's-place, London, E.C.3.

Sarawak.—Appointments are in the hands of H.H. the Rajah. Information from the Sarawak Government Offices, Millbank House, London, S.W.1.

Basutoland, Swaziland, and the Bechuanaland Protectorate.—Appointments are made upon the recommendation of the resident commissioners, subject to the approval of the High Commissioner for South Africa and confirmation by the Secretary of State for Dominion Affairs. These appointments are usually filled by the selection of local candidates.

Shanghai Municipal Appointments.—Inquiries regarding appointments under the Shanghai Municipality, including appointments in the Shanghai Police Force, should be addressed to Messrs. J. Pook and Co., 68, Fenchurch-street, London, E.C.3.

Chinese Maritime Customs.—Inquiries regarding appointments should be addressed to the Inspector-

General of the Chinese Maritime Customs, 26, Old Queen-street, London, S.W.1.

Consular Appointments.—Application for appointments of a Consular nature should be addressed to the Foreign Office, London, S.W.1.

Trade Commissionerships.—Applications for appointment as trade commissioner in the colonies and elsewhere should be addressed to the Department of Overseas Trade (Development and Intelligence), 35, Old Queen-street, London, S.W.1.

WOMEN'S MEDICAL SERVICE FOR INDIA

AMONG careers open to medical women abroad the Women's Medical Service for India deserves honourable mention. The Service is open to fully qualified medical women of British or Indian nationality, and with the present amount of Government subsidy the number of medical officers is limited to 44. Medical women proceeding to India to join the Women's Medical Service receive a sufficient sum for a first-class passage to India. On landing they are posted to one of the larger women's hospitals to gain Indian experience and to learn the language. For a further period they are appointed to act temporarily for medical women on furlough. They are then definitely appointed to the charge of hospitals. Private practice is allowed, provided it does not interfere with official duties. The only exception is in administrative or educational posts, when an allowance in lieu of practice is given. The amount obtained from practice varies according to the station, but in most cases it forms a fair addition to the salary, varying from £150 to £1000 a year.

Excellent opportunities for surgery—especially gynæcological—are found in the Women's Medical Service. To those who are not keen surgeons opportunities are likely to open in the future in connexion with maternity and child welfare.

The cost of living in India is much higher than formerly, but it should be possible for a medical woman (with house provided) to meet actual household expenses for about Rs.300 per mensem, leaving the remainder of her salary for dress and personal expenses. To this must be added the necessary saving to meet additional expense for furlough and leave spent in the hills.

Rates of pay are as follows :—

Years of service.	Overseas allowance per mensem.	Salary per mensem.	English equivalent* per annum.
1 to 3	Rs.100	Rs.450	£440
4 to 6	„	Rs.500	£480
7 to 9	„	Rs.550	£520
10 to 12	„	Rs.600	£560
13 to 15	Rs.150	Rs.650	£600
16 to 18	„	Rs.700	£640
19 to 21	„	Rs.750	£680
22 to 24	„	Rs.800	£720
over 24	„	Rs.850	£760

* At rupee value 1*s.* 4*d.*

Furnished quarters are provided, representing an additional Rs.150 per mensem.

Leave on average pay is earned at the rate of 2/11ths of the period spent on duty.

Study-leave is granted to the extent of 12 months in the total service and will not be granted more than twice in the course of an officer's service. During study-leave an officer draws half average pay, with a study allowance at the rate of 12*s.* a day during the course of study. Officers of European domicile are entitled to four free return first-class passages from a port in India to a port outside India in their whole service. The first passage is not granted until after the expiry of four years' approved service, and thereafter passages may be granted at intervals of not less than four years. There is a Provident Fund to which members of the Service contribute 10 per cent. of their pay. The Service contributes another 10 per cent., which accumulates at interest and is repaid on retirement.

Admission to the Service is made by selection in India and England—preference being given to those with Indian experience. Vacancies are few. Candidates in the United Kingdom should apply to the Hon. Secretary, United Kingdom Branch of the Countess of Dufferin's Fund, care of India Office, Whitehall, London. Candidates in India should apply to the Chief Medical Officer, Women's Medical Service, Countess of Dufferin's Fund, Simla and Delhi.

THE L.C.C. HOSPITAL SERVICE

THE hospital service of the London County Council provides opportunities for valuable experience for medical graduates who intend to be general practitioners or consultants, as well as for those who intend to make the public health service their career. Under the operation of the Local Government Act, 1929, the L.C.C. became responsible for the management of 76 hospitals (excluding mental hospitals)—namely, 28 general hospitals, 2 convalescent hospitals, 17 fever and other infectious diseases hospitals, 6 tuberculosis hospitals and sanatoria, 9 hospitals and convalescent homes for children, 12 hospitals and institutions for chronic sick patients, and 2 colonies for sane epileptics.

Medical superintendents of the hospitals, who are expected to be experienced hospital administrators, receive £900 to £1650 a year, corresponding to hospitals varying in accommodation from 160 to 1390 patients. In addition, medical superintendents are provided with an unfurnished house or quarters, with payment by the Council of local and water rates. The subordinate staff is classified thus :

Grade.	Scale of annual salary.
Deputy Medical Superintendent, Grade I.	£650–£50–£800
Deputy Medical Superintendent, Grade II.	£600–£30–£750
Senior Assistant Medical Officer, Grade I.	£550–£25–£650
Senior Assistant Medical Officer, Grade II.	£500–£25–£600
Assistant Medical Officer, Grade I. ..	£350–£25–£425
Assistant Medical Officer, Grade II. ..	£250 (fixed)

In addition all these officers are provided with board, lodging, and washing, valued at £150 a year. All the positions mentioned involve full-time duties, and it is a condition of service that such officers shall not undertake any other paid employment. The staffing provides, where necessary, for house physicians or house surgeons, remunerated at the rate of £80 a year, with residence, and for clinical assistants, who are non-resident and receive £100, with meals when on duty. These officers are not employed in a whole-time capacity and are granted adequate leisure for study.

Vacancies in the higher grades are filled, as far as possible, by promotion from the existing staff. All full-time medical staff are allowed liberal annual leave with pay, and full pay during sickness for a reasonable period. For subordinate staff, the extent and fluidity of the hospital service provides unique opportunities for a variety of experience, and facilities exist for specialisation and for officers to follow courses of study outside the service with a view to improving their professional qualifications.

During the past year about 90 vacancies have been filled, including 6 positions as medical superintendents, 1 as deputy medical superintendent, 15 as senior assistant medical officers, and 56 as assistant medical officers. During the year also a large number—more than 200—of part-time consultants have been appointed to the various units and groups of these hospitals. These appointments, which vary from 1 to 6 sessions a week, include physicians, surgeons, obstetricians, anæsthetists, pædiatrists, neurologists, orthopædists, radiologists, dermatologists, ophthalmologists, urologists, and specialists in ear, nose, and throat.

Post-graduate facilities.—These are as follows:—

St. Alfege's Hospital: Facilities are afforded to the Final Fellowship Class of Guy's Hospital to examine selected cases. The demonstration is undertaken by a surgical tutor of the class.

St. James' Hospital: The South-West London Post-Graduate Association has its headquarters at this hospital where three sessions of lectures are given annually—Christmas, Lent, and Summer. Usually 8 or 9 demonstrations are given per session.

Instruction in orthopædic surgery is also given, in collaboration with the Fellowship of Medicine.

Lambeth Hospital: Post-graduate instruction is given in collaboration with the Fellowship of Medicine at fortnightly classes.

St. Peter's Hospital: Post-graduate students from the London Hospital, who are reading for the final F.R.C.S. examination, attend to receive clinical instruction by the consulting surgeon.

Special Units.—Special departments in general hospitals are available—namely, at Hammersmith Hospital for the treatment of cases by plastic surgery; at Lambeth Hospital for the treatment of patients by radium therapy; at New End Hospital for the treatment of patients suffering from thyroid disease; and at St. Stephen's Hospital for rheumatic cases.

PRISON MEDICAL SERVICE

Candidates for the Prison Medical Service are approved by the Secretary of State for the Home Department on the recommendation of the Prison Commissioners. Preference is always given to candidates who have experience of lunacy. Application for employment may be made on a special form, which can be obtained from the Secretary, Prison Commission, Home Office, London, S.W. In the smaller prisons the medical officership is part-time, and is usually filled by practitioners in the locality, preference being given to those who have special experience of lunacy. In the large prisons the medical staff must devote their whole time to the Service. In the case of whole-time service, the appointment is in the first instance to the post of Medical Officer, Class II., and from this rank the Medical Officers, Class I., are selected as vacancies occur. The pay of the whole-time prison medical staff is as follows: Medical Officer, Class II., £505 7*s.* a year, proceeding by annual increments to £726 a year, the maximum being normally attainable after 10 years' approved service; Medical Officer, Class I., £783 15*s.* a year, proceeding by annual increments to £939 14*s.* a year, the maximum being normally attainable after 6 years' approved service. Unfurnished quarters are provided or an allowance in lieu is made. The conditions of service are liable to review. Study-leave is granted annually to two of the whole-time Medical Officers. There are 12 full-time medical officers of Class I. and 15 Class II. and 23 part-time medical officers. The number of vacancies is never large.

SPECIAL DIPLOMAS

DIPLOMA IN PUBLIC HEALTH

The following epitomises the instruction given at various universities and centres of medical education to medical men desiring to obtain diplomas in sanitary science, public health, hygiene, or State medicine, as this discipline is variously called. Resolutions and rules, designed with a view of ensuring "the possession of a distinctively high proficiency, scientific and practical, in all branches of study which concern the public health," have been adopted at various times by the General Medical Council. The diploma is registrable by the Council, whose rules on the curriculum become binding on the educational bodies concerned. The present resolutions and rules, which came into force in 1931, postpone the granting of a diploma until at least two years from qualification.

London School of Hygiene and Tropical Medicine

The course of study for the Diploma in Public Health will commence on Oct. 2nd in the premises in Keppel-street (Gower-street), the gift of the Rockefeller Foundation, which has excellent laboratories and research rooms, a fine lecture theatre and classrooms, library, and museum. The course, which will extend over a period of nine months, for those prepared to give whole-time study, is designed in compliance with the requirements of the General Medical Council, and will enable students, who wish to do so, to proceed to the academic Diploma in Public Health of London University. The curriculum has been planned on very practical lines, and includes, in addition to work with Medical Officers of Health in selected areas, a large number of visits to places of public health interest. The Course includes provision for the necessary instruction in infectious disease and hospital management, lectures and demonstrations on physiology applied to hygiene and industry, medical industrial psychology, and sanitary engineering. A series of lectures is given by eminent authorities on special subjects, and these lectures are open to members of the medical profession as well as to students of the School. The London County Council, the City of London, and various other bodies have placed their resources at the disposal of the School for teaching purposes.

D.P.H. Studentship.—In the Public Health Course one place will be allotted, without fees, after open competition in September, the successful candidate being awarded the Fishmongers' Company Studentship.

English Conjoint Board

The regulations for the Diploma in Public Health of the Royal College of Physicians of London and the Royal College of Surgeons of England are as follows:—

Candidates must have obtained a registrable qualification in medicine, surgery, and midwifery. The examination consists of two parts, both of which are held in January, June, and October, and candidates may enter for either part separately, or at the same time; the passing of Part I. must precede that of Part II. The examination will be written, oral, and practical. Part II. includes a practical examination in infectious diseases, food inspection, and inspection of selected premises. Candidates who fail in either part may sit at a subsequent examination on payment of the fees.

Candidates will be admissible to examination in Part I. on producing evidence of having attended during not less than 280 hours at an Institution recognised by the Examining Board in England, after obtaining a registrable qualification, practical instruction in (*a*) Bacteriology and Parasitology (including Immunology, Serology, Medical Entomology, &c.), especially in their relation to diseases of man and to those diseases of the lower animals which are transmissible to man. (*b*) Chemistry, Physics, Radiology, and Electrology in relation to Public Health. (*c*) Physiology and Biochemistry in their application to nutrition and hygiene. (*c*) Meteorology and Climatology in relation to Public Health.

Candidates will be admitted to Part II. of the Examination on producing evidence (1) of having been in possession of a registrable qualification in medicine, surgery, and midwifery, during not less than two years, of being registered by the General Medical Council, and of having completed the curriculum for the Diploma extending over a period of twelve calendar months (or an academic year of whole-time study covering a period of not less than nine calendar months) subsequent to the attainment of a registrable qualification. (2) Of having attended, after obtaining the registrable qualification, instruction during not less than 120 hours at an Institution recognised by the Examining Board in England in the following subjects: (*a*) The Principles of Public Health and Sanitation; (*b*) Epidemiology and Vital Statistics; (*c*) Sanitary Law and Administration (including Public Medical Services); (*d*) Sanitary Construction and Planning. (3) Of having attended for three months the clinical practice of a hospital for infectious diseases recognised by the Examining Board in England, and of having therein received instruction in the methods of administration. (At least 24 daily attendances of not less than 2 hours are necessary.) (4) Of having been engaged during a period of not less than six months in acquiring a practical knowledge of the duties, routine and special, of public health administration under the supervision of a medical officer of health, and of having received from such officer or other competent medical officer during not less than three hours on each of 60 working days, practical instruction in those duties and also those relating to (*a*) Maternity and Child Welfare Service; (*b*) Health Service for children of school age; (*c*) Venereal Diseases Service; (*d*) Tuberculosis Service; (*e*) Industrial Hygiene; (*f*) Inspection and Control of Food, including meat and milk. (Instruction in (*a*) to (*f*) must include attendance at the centres, clinics, institutions, and premises concerned.) The above certificate (4) must be obtained from a medical officer of health who devotes his whole time to public health work, or from a medical officer of health of a sanitary area having a population of not less than 50,000, or in Ireland the medical superintendent of health of a county or county borough having a population of not less than 50,000.

University of London

The course of study for the Academic Diploma in Public Health extends over twelve calendar months (or an academic year of whole-time study covering a period of not less than nine calendar months). The examination is in two parts and candidates must pass in all subjects of Part I. before being admitted to Part II. The course for Part I. consists of not less than 280 hours' practical instruction in (*a*) Bacteriology and Parasitology; (*b*) Chemistry, Physics, Radiology, and Electrology in relation to Public Health; (*c*) Physiology and Biochemistry in their application to nutrition and hygiene; (*d*) Meteorology and Climatology in relation to Public Health. The course for Part II. consists of not less than 120 hours' instruction in (*a*) Principles of Public Health and Sanitation; (*b*) Epidemiology and Vital Statistics; (*c*) Sanitary Law and Administration; (*d*) Sanitary Construction and Planning.

Parts I. and II. of the Examination are held twice a year.

Candidates for the M.D. Degree may offer Hygiene Medicine as a subject in which to graduate (not registrable as a public health diploma). The regulations may be obtained on application to the Academic Registrar, University of London, South Kensington.

University of Durham

The degree of Bachelor of Hygiene (B.Hy.), and the Diploma in Public Health (D.P.H.). A period of not less than two years must elapse between the attainment by a candidate of a registrable degree or qualification in Medicine, Surgery, and Midwifery, and his admission to the Final Examination for the degree of Bachelor of Hygiene or for the Diploma in Public Health of the University *as the case may be*. The curriculum extends over a period of not less than twelve calendar months (or an academic year of whole-time study, covering a period of not less than nine calendar months), subsequent to the attainment of a registrable degree or qualification. Candidates for the B.Hy. must take out the curriculum for Part I. of the Examination at the University of Durham, but for the D.P.H. may do so either at the University or at any medical school or institution recognised by the University. The examination is divided into two parts. Part I. is practical, written, and oral, and includes the subjects of Bacteriology and Parasitology (including Immunology, Serology, Medical Entomology, &c.), especially in their relation to diseases of man, and to those diseases of the lower animals which are transmissible to man; Chemistry, Physics, Radiology, and Electrology, in relation to Public Health; Physiology and Biochemistry in their application to nutrition and hygiene; and Meteorology and Climatology in relation to Public Health. The subjects in Part II. include the Principles of Public Health and Sanitation; Epidemiology and Infectious Diseases; Vital Statistics; Sanitary Law and Administration (including Public Medical Services); Sanitary Construction and Planning; and Public Health Administration. This part of the examination is written and oral, and includes practical examinations in Infectious Diseases, Food Inspection, Inspection of premises, dwelling houses, factories, workshops, schools, &c.

Candidates are not admitted to examination, in either part, until after they have completed the prescribed courses of instruction in the required subjects. Doctor of Hygiene (D.Hy.): Candidates must be Bachelors of Hygiene of the University of two years' standing, and are required to satisfy the examiners that they have conducted original research in the subject of Public Health.

University of Birmingham

The University grants the Degree M.D. (State Medicine) under the following conditions: Graduates in medicine of this University may become candidates for the degree when they possess a Diploma in Public Health (D.P.H.) recognised for registration by the General Medical Council; or a recognised Degree in Public Health or Hygiene; they must have been engaged, for at least one year subsequently to obtaining a registrable Diploma in Public Health, in post-graduate study of State Medicine, pursued in a laboratory of the University or in a hospital associated with the University, or whilst holding an appointment in the Public Health Service, or partly in each of such places, provided that the full period of post-graduate study occupies not less than one year and is approved by the Faculty of Medicine. The candidate presents a thesis on some public health subject and must pass a written and viva voce examination in the principles and practice of public health.

A candidate whose thesis is of exceptional merit may be exempted from the whole or any part of the examination, and Honours are awarded at the discretion of the Examiners.

Graduates in medicine of other Universities who possess a degree of a British or Colonial University recognised for registration by the General Medical Council and approved by the Senate of the University, and who have taken not less than three years of their curriculum in the Birmingham Medical School, may become candidates for the Degree of M.D. (State Medicine) under similar conditions as are required in the case of graduates of the University of Birmingham. Graduates in medicine of other approved Universities who are not past students of the Birmingham Medical School may become candidates for the Degree of M.D. (State Medicine) under the above regulations on completing *two* years of post-graduate study under the general conditions laid down above.

The University grants a Diploma in Public Health under conditions approved by the General Medical Council. The examination is held in March and June (Part I.), October and March (Part II.), each part being written, oral, and practical. No candidate will be allowed to pass Part II. until he has passed Part I. Candidates may enter for Parts I. and II. separately or at the same time. The fee for each part of the examination is £6 5s.

University of Liverpool

The University grants a Degree in Hygiene (M.H.) and a Diploma (D.P.H.), and every facility is afforded *for training in Sanitary Science and State Medicine.* The curriculum for the Degree extends over a period of two years, the first of which is devoted to laboratory instruction and practical classes (including those for the Diploma); the second being devoted to advanced study and research.

University of Leeds

The University grants a Diploma in Public Health, and every facility is afforded for training in Sanitary Science and State Medicine. The examination, which is held twice in each year—namely, in March and September—is in two parts, and is written, oral, and practical. Candidates must pass in Part I. before being admitted to Part II. Instruction in Entomology and Meteorology is given in the first term, and in Sanitary Chemistry and Bacteriology, Physiology, and Biochemistry, as applied to nutrition, Radiology and Electrology, in the first and second terms. Practical work under arrangement with the Leeds City Council. Prospectus can be obtained from the Academic Sub-Dean of the Medical School.

University of Bristol

Diploma in Public Health. Candidates must be at least 23 years of age, shall be fully registered medical practitioners of not less than two years' standing as such, and shall have passed the examination prescribed by regulations, which can be obtained from the Registrar upon application.

University of Wales

Candidates for the Diploma in Public Health, the curriculum for which extends over a period of not less than twelve calendar months, or an academic year of whole-time study covering a period of not less than nine calendar months, subsequent to the attainment of a registrable qualification, must produce evidence of having pursued at the Welsh National School of Medicine courses of instruction in Bacteriology and Parasitology, Chemistry, Physics, Radiology and Electrology, and Meteorology and Climatology in relation to Public Health, and Physiology and Biochemistry in their application to nutrition and hygiene. Candidates must also satisfy the examiners that they have received instruction approved by the University in the Principles of Public Health and Sanitation, Epidemiology and Vital Statistics, Sanitary Law and Administration, and Sanitary Construction and Planning. The candidate must produce evidence that he has attended for three months on the clinical practice of a hospital for infectious diseases containing not less than 100 beds, and has received therein instruction in the methods of administration, and that he has for a period of not less than six months been engaged in acquiring a practical knowledge of the duties, routine and special, of a public health administration under the supervision of a medical officer of health. The examination for the diploma is divided into two parts, Part I. and Part II., each of which extends over not less than two days. A candidate must pass in all the subjects of Part I. before being admitted to Part II. of the examination. In Part I., and also in Part II., a candidate must pass in all the specified subjects at one time. Part I. of the examination is practical, written, and oral, and comprises Bacteriology and Parasitology (including immunology, serology, medical entomology), Chemistry, Radiology and Electrology. Physics and Meteorology and Climatology in relation to Public Health, and Physiology and Biochemistry in their application to nutrition and hygiene. Candidates may not be admitted to Part I. of the examination until they have been certified as having pursued the prescribed courses of instruction in the subjects thereof. Part II. of the examination, which is written and oral, comprises: The principles of Public Health and Sanitation, Epidemiology and Vital Statistics, Sanitary Law and Administration (including Public Medical Services), and Sanitary Construction and Planning. No candidate can be admitted to Part II. of the examination until after the lapse of not less than two years from the date of his obtaining a registrable qualification in Medicine, Surgery, and Midwifery, which qualification must be registered in the Medical Register before admission to Part II. of the examination. An examination in each part will be held annually. The examination in Part I. will be held in June, that in Part II. in October. Full information may be obtained from the Registrar of the University, University Registry, Cathays Park, Cardiff. Entries for the examination in Part I. must be received by him not later than May 1st, and not later than Sept. 1st for the examination in Part II.

University of Edinburgh

Candidates for the Diploma in Public Health must be graduates in medicine and surgery of the University, or hold corresponding degrees or registrable medical qualifications which must be registered before admission to examination. The course is divided into two parts. In each part the candidate must pass in all the specified subjects at one examination. Candidates are not admitted to Part II. until they have passed Part I., nor until after the lapse of not less than two years from the date of obtaining a registrable medical qualification. The subjects of the examination are: Part I. (written, oral, and practical), Bacteriology and Immunology; Entomology and Parasitology; Chemistry, Biochemistry, and Physiology in their application to nutrition and hygiene; Physics, Radiology, Electrology, Meteorology, and Climatology in relation to Public Health. Part II. (written, oral, and practical), Hygiene, Sanitation, and Sanitary Construction; Epidemiology and Infectious Diseases; Sanitary Law and Vital Statistics; Public Health Administration. There is also included practical examinations in Infectious Diseases, Food Inspection, and Inspection of Premises. The course, which extends over an academic year of full-time study, begins in October, and provision is made by the University for instruction in all the subjects. Detailed particulars may be obtained from the Dean of the Faculty of Medicine.

University of Aberdeen

Every candidate for the Diploma in Public Health must be a graduate in medicine of the University of Aberdeen, or of any other University whose medical degrees are recognised as qualifying for registration by the General Medical Council of the United Kingdom. No candidate will be admitted to the Final Part of the Examination for the Diploma until after the lapse of not less than two years from the date of his obtaining a registrable qualification in Medicine, which qualification shall have been registered before such admission. The whole of the prescribed curriculum of study must be undertaken after the candidate has obtained a registrable qualification in medicine, and shall extend over not less than twelve calendar months (or an academic year of whole-time study covering a period of not less than nine calendar months). At least one academic term must be spent at the University of Aberdeen. Candidates shall produce evidence of having complied with the following requirements in respect of study and training:—1. Practical instruction in the following subjects within a laboratory or laboratories approved by the University during not less than 280 hours: (*a*) Bacteriology and Parasitology (including immunology, serology, medical entomology, &c.), in relation to diseases of man and diseases of lower animals transmissible to man; (*b*) Chemistry, Physics, Radiology, and Electrology in relation to Public Health; (*c*) Physiology and Biochemistry in their application to nutrition and hygiene; (*d*) Meteorology and Climatology in relation to Public Health. The above instruction to extend over not less than five months or two academic terms. 2. A course or courses of instruction extending over not less than 120 hours dealing with: (*a*) The Principles of Public Health and Sanitation; (*b*) Epidemiology and Vital Statistics; (*c*) Sanitary Law and Administration (including Public Medical Services); (*d*) Sanitary Construction and Planning; such course or courses to be given at an institution or by a teacher or teachers approved by the University. 3. Practical instruction, clinical and administrative, within a recognised hospital for general infectious diseases; such instruction to extend over three months, and to include 24 daily attendances of not less than two hours each. 4. *Practical instruction and experience*, during not less than six months (including attendance of at least three hours on each of sixty working days) in the duties, routine and special, of public health administration, under the supervision of a medical officer of health, who shall certify that the candidate has received from this officer or other competent medical officer, practical instruction in these duties and also in those relating to: (*a*) Maternity and Child Welfare Service; (*b*) Health Service for Children of School Age; (*c*) Venereal Diseases Service; (*d*) Tuberculosis Service; (*e*) Industrial Hygiene; (*f*) Inspection and Control of Food, including meat and milk. (Instruction in (*a*) to (*f*) shall include attendance at the centres, clinics, institutions, and premises concerned.) The medical officers of health recognised for this purpose by the General Medical Council are: (*a*) a medical officer of health who devotes his whole time to public health work; or (*b*) the medical officer of health of a sanitary area having a population of not less than 50,000; or (*c*) in Ireland, the medical superintendent officer of health of a county or county borough having a population of not less than 50,000. The examination for the diploma is divided into two parts, each of which extends over not less than three days. A candidate must pass in all the subjects of Part I. before being admitted to the examination for Part II. In Part I. and also in Part II. a candidate must pass in all the specified subjects at one time.

University of Glasgow

Degree of B.Sc. in Public Health.—Candidates must be graduates in Medicine of a University of the United Kingdom, or of some other University recognised for the purpose by the University Court. Candidates must produce evidence (1) that, after they have obtained a registrable Degree in Medicine, a period of not less than two years has elapsed; (2) that, after they have obtained a registrable degree in Medicine, they have, during a period of not less than 21 calendar months, pursued the course of work and instruction prescribed, and have satisfied the examiners in the prescribed examinations.

There are two examinations. Part I. includes the following subjects: (i) Bacteriology and Parasitology (including Immunology, Serology, and Medical Entomology); (ii) Chemistry, Physics, Radiology, and Electrology in relation to Public Health; (iii) Physiology and *Biochemistry in relation to* Public Health; (iv) Meteorology and Climatology in relation to Public Health; (v) Higher Chemistry in relation to Public Health; (vi) Higher Physics and Geology. *A candidate must pass* in the subjects marked (i), (ii), (iii), and (iv) of Part I. at one examination. Part II. includes the following subjects: (vii) Hygiene and Sanitation (including sanitary construction and planning); (viii) Epidemiology and Infectious Diseases; (ix) Sanitary Law and Vital Statistics; (x) Public Health Administration; (xi) Applied Hygiene. The examination for Part II. includes practical examinations in Infectious Diseases; Food Inspection; Inspection of Premises, such as dwellings, factories, workshops, bakehouses, dairies, cowsheds, schools, hospitals, clinics, and the like. The examination in Applied Hygiene may be on a selected subject professed by the candidate. A candidate must pass in the subjects marked (vii), (viii), (ix), and (x) of Part II. at one examination. *Diploma in Public Health (D.P.H.).*—Candidates for this Diploma must be legally qualified medical practitioners who are matriculated students of the University. A period of not less than two years must elapse between the attainment by the candidate of a registrable medical qualification, and his admission to the final examination (Part II.) for the Diploma. The candidate must during a period of not less than twelve calendar months subsequent to his attainment of a registrable medical qualification, pursue the course of work and instruction prescribed, and pass the prescribed examinations. The examination, which is both written and oral, is divided into two parts, Part I. and Part II., each of which extends over not less than two days. No candidate is admitted to either part of the examination until he has completed the prescribed courses of instruction in the subjects of that part. No candidate is admitted to Part II. until he has passed in all the subjects of Part I., nor until after the lapse of not less than two years from the date of his obtaining a registrable medical qualification, nor unless he presents a certificate showing that his name and qualification have been duly registered in the Medical Register. Part I. includes: (i) Bacteriology and Parasitology (*including Immunology, Serology, and Medical Entomology*); (ii) Chemistry, Physics, Radiology, and Electrology in relation to Public Health; (iii) Physiology and Biochemistry in relation to Public Health; (iv) Meteorology and Climatology in relation to Public Health. A candidate must pass in all the subjects at one examination. Part II. includes: (v) Hygiene and Sanitation (including Sanitary Construction and Planning); (vi) Epidemiology and Infectious Diseases; (vii) Sanitary Law and Vital Statistics; (viii) Public Health Administration. A candidate must pass in all the subjects at one examination. The examination for Part II. includes practical examinations in Infectious Diseases; Food Inspection; Inspection of Premises, such as dwellings, factories, workshops, bakehouses, dairies, cowsheds, schools, hospitals, clinics, and the like.

University of St. Andrews

The Diploma in Public Health is open to those who hold a registered medical qualification of the United Kingdom. The examination is in two parts. (1) (*a*) Bacteriology and Parasitology; (*b*) Chemistry and Physics; (*c*) Meteorology and Climatology. (2) Public Health and Sanitation, Epidemiology and Vital Statistics, Sanitary Law and Administration, and Sanitary Construction and Planning. Before admission to the first examination the candidate must have held his medical qualification for one year, and before admission to the second examination for two years. Graduates in Medicine of the University of St. Andrews may take part or all of the qualifying classes in any University of the United Kingdom, or in any Indian, Colonial, or Foreign University or medical school recognised by the University Court, but holders of other registered medical qualifications must spend at least 8 out of the 12 months' curriculum in St. Andrews University. *A complete course is given in the Conjoint* Medical School, Dundee.

Scottish Conjoint Board

All candidates for the Diploma in Public Health must have a qualification which has been registered under the Medical Acts. The examination is divided into two parts.

For Part I. the candidate must produce evidence of having received during a period of not less than five months at an institution recognised by the Board practical instruction in: (*a*) Bacteriology and *Parasitology (including Medical Entomology)*, especially in their relation to diseases of man and to those diseases of the lower animals which are transmissible to man, during 180 hours, of which not less than *150 hours have been occupied in practical* laboratory work; (*b*) Chemistry and Physics in relation to Public Health during 90 hours, of which not less than 70 hours have been occupied in practical laboratory work; (*c*) Meteorology and Climatology in relation to Public Health during not less than 10 hours. For Part II. evidence must be given of having received instruction during not less than 80 hours in: (*a*) The Principles of Public Health and Sanitation for not less than 30 hours; (*b*) Epidemiology and Vital Statistics for not less than 20 hours; (*c*) Sanitary Law and Administration (including Public Medical Services) during not less than 20 hours; (*d*) Sanitary Construction and Planning during not less than 10 hours; of having attended for three months the clinical practice of a recognised hospital for infectious diseases; and of having been engaged during a period of not less than six months in acquiring a knowledge of Public Health administration in addition to practical instruction in the duties relating to: (*a*) Maternity and Child Welfare Service; (*b*) Health Service for Children of School Age; (*c*) Venereal Diseases Service; (*d*) Tuberculosis Service; (*e*) Industrial Hygiene; (*f*) Inspection and Control of Food, including meat and milk. The fee is 12 guineas for both examinations, or 6 guineas for either of them. A fee of 6 guineas is payable by rejected candidates for either examination. The examination is held twice yearly, in March in Glasgow, and October in Edinburgh. The published regulations provide detailed synopses of the subjects of examination. The Registrar for Edinburgh is Mr. David Thomson, 49, George-square, and for Glasgow, Mr. David Willox, 242, St. Vincent-street.

University of Dublin (Trinity College)

The Diploma in Public Health is conferred, after examination, under the following conditions. The candidate must be a registered medical practitioner and have obtained a registrable qualification at least two years before the second part of the examination. The candidate must have completed, subsequently to obtaining a registrable qualification, 280 hours' practical instruction in a chemical and bacteriological laboratory, or laboratories, approved by the University, must have received instruction in the following subjects: physics, radiology, electrology, physiology, biochemistry, meteorology, and climatology, the principles of public health and sanitation, epidemiology and vital statistics, sanitary law and administration (including public medical services), sanitary construction and planning; must have studied, practically, outdoor sanitary work for six months under an approved officer of health, and must have attended for three months at a fever hospital where opportunities are afforded for the study of methods of administration. The De Renzy Centenary Prize, value about £15, is awarded to the candidate who obtains the highest marks at the March and June examinations each year, provided sufficient merit is shown. A special prospectus may be obtained by application to the Registrar of the School of Physic, Trinity College, Dublin.

National University of Ireland

At this University there is a Diploma in Public Health, a B.Sc. in Public Health, and a D.Sc. in Public Health.

University of Belfast

A Diploma in Public Health is given by examination. Courses of instruction are given both for Part I. and Part II. of the examination, extending over a period of one academic year. The curriculum follows that laid down by the General Medical Council.

Irish Conjoint Board

Every candidate for the Diploma in Public Health must observe the following rules: (1) A period of not less than two years shall elapse between the attainment by a candidate of a registrable qualification in Medicine, Surgery, and Midwifery, and his admission to the Final Examination for a Diploma or Degree in Sanitary Science, Public Health, or State Medicine. (2) The curriculum for a Diploma or Degree in Sanitary Science, Public Health, or State Medicine shall extend over a period of not less than twelve calendar months (or an academic year of whole-time study covering a period of not less than nine calendar months) subsequent to the attainment of a registrable qualification. (3) Every candidate shall produce evidence of having attended, during not less than 280 hours, at an institution approved by the Licensing Body granting the Diploma or Degree, practical instruction in (*a*) Bacteriology and Parasitology, especially in their relation to diseases of man, and to those diseases of the lower animals which are transmissible to man; (*b*) Chemistry, Physics, Radiology, and Electrology in relation to Public Health; (*c*) Physiology and Biochemistry in their application to nutrition and hygiene; (*d*) Meteorology and Climatology in relation to Public Health. (4) Evidence must be produced of having received, during not less than 120 hours, at an institution approved by the Licensing Body granting the Diploma or Degree, instruction in (*a*) the Principles of Public Health and Sanitation; (*b*) Epidemiology and Vital Statistics; (*c*) Sanitary Law and Administration (including Public Medical Services); (*d*) Sanitary Construction and Planning. (5) Evidence of attendance for three months on the clinical practice of a recognised hospital for Infectious Diseases, and has received therein instruction in the methods of administration. At least 24 daily attendances of not less than two hours each shall be required. (6) Evidence is required that the candidate has, during a period of not less than six months, been engaged in acquiring a practical knowledge of the duties, routine and special, of Public Health Administration under the supervision of a Medical Officer of Health.

The examination for Part I. is practical, written, and oral. The examination for Part II. is written and oral, and includes practical examinations in Infectious Diseases; Food Inspection; Inspection of Premises—dwellings, factories, workshops, schools, &c. No candidate may be admitted to Part II. of the examination for a registrable Diploma or Degree in Public Health until after the lapse of not less than two years from the date of his obtaining a registrable qualification in Medicine, Surgery, and Midwifery.

Royal Institute of Public Health

Facilities are offered at this Institute for the course of instruction for the Diploma in Public Health. The laboratories are well equipped and pleasantly situated. In the Chemical Department lectures and courses of practical instruction are given by Dr. Alan W. Stewart, D.Sc. The Bacteriological Laboratories are under the charge of Dr. E. Goodwin Rawlinson, where practical instruction in Public Health, Bacteriology, and lectures on Immunology are given. The analysis, both chemical and bacteriological, of water, milk, sewage effluents, &c., are undertaken at the Institute. Pathological examinations and investigations are carried out for medical practitioners. An interesting branch of work has lately developed in the investigation of a new colloidal vanadate test of the blood-serum for cancer and the establishment of a Clinic for the treatment of cancer with an endocrine gland method. The Aschheim-Zondek test for pregnancy is also carried out in the Pathological Department. The Harben Lectures will be delivered in October by Mr. J. C. Drummond, D.Sc., F.I.C., Professor of Biochemistry in the University of London. Further information may be obtained on application to the Secretary at the Offices of the Institute, 23, Queen-square (and Guilford-street), London, W.C.1.

THE GUILD OF ST. LUKE was founded 69 years ago by a few medical students, chiefly to meet their own religious needs. It now makes a wider appeal, and its membership is open to all students and practitioners of medicine, both men and women, who are members of the Church of England, the clergy of which are eligible as Clerical Associates. The Chapter meets at St. Nicholas Cole Abbey, London, E.C. Particulars of the objects and activities of the Guild can be obtained on application to the Secretary, Guild of St. Luke, 43A, Matheson-road, W.14.

DIPLOMA IN PSYCHOLOGICAL MEDICINE

THE Universities of Cambridge, London, Durham, Leeds, Manchester, Edinburgh, Dublin, Ireland, and the English Conjoint Board now grant diplomas in psychological medicine under conditions that are fairly comparable in the standard of the tests and in the duration of the courses; the details on these points can be obtained from the various examination bodies.

In London, courses of instruction for the Diploma in Psychological Medicine are given annually at the Maudsley Hospital, Denmark Hill, which has recently been definitely recognised as a school of the University of London. The course consists of two parts, commencing in January, and is adapted for the diploma of the Conjoint Board, the University of London, or the University of Cambridge. The parts may be taken separately; also during the year there are other short courses, lectures, and demonstrations in psychological medicine.

Maudsley Hospital

Appointments as clinical assistants are obtainable at the Maudsley Hospital. The holding of such appointments for varying periods satisfies the requirements of the different examining bodies in respect of practical study of mental disorders. The appointments and other facilities for clinical experience are open to qualified medical practitioners apart from the courses of instruction. A course for the Diploma in Psychological Medicine is held annually from January to June at the Central Pathological Laboratory of the London County Mental Hospitals, which is situated in the Maudsley Hospital. Facilities and grants-in-aid are given for research work in psychiatry and allied subjects at the Laboratory. Inquiries as to lectures should be addressed to the Director of the Central Pathological Laboratory, Maudsley Hospital, Denmark Hill, S.E.; and as to clinical facilities, to the Medical Superintendent at the same address.

Bethlem Royal Hospital

A course of lectures and practical instruction for the Diploma in Psychological Medicine, granted by the various universities and the Conjoint Board, is held at Bethlem Royal Hospital, Monk's Orchard, Eden Park, Beckenham, twice annually, during the spring and autumn. Part A or Part B, however, may be taken separately. In addition to the above, clinical instruction in Psychological Medicine is given at Bethlem Royal Hospital every morning (except Wednesdays) at 11 A.M. A reduction is made to those who attend the Diploma Course. House physicians are appointed at Bethlem Royal Hospital for a term of six months, which may be extended. These appointments are made at the beginning of February, May, August, and November in each year, and the vacancies are advertised in the medical papers. Apartments, complete board, attendance, and laundry are provided, and a salary at the rate of £150 per annum for the first three months, rising, if commendable service be given, to the rate of £200 per annum for the second period of three months. Clinical assistants are often appointed from time to time for periods of three months or longer. These are non-salaried and non-resident posts, but partial board is provided. The Physician-Superintendent, Bethlem Royal Hospital, Monk's Orchard, Eden Park, Beckenham, will supply further particulars.

University of Edinburgh

Candidates for the Diploma in Psychiatry must be graduates in medicine and surgery of the University of Edinburgh or hold corresponding registrable degrees or qualifications of some other licensing body. Candidates are required subsequent to the date of graduation or obtaining a registrable qualification to have held (*a*) a resident appointment for one year in a hospital for mental disorders approved by the Faculty of Medicine, or alternatively (*b*) a six months' appointment as defined in (*a*) and six months' practical study of nervous diseases in a special or general hospital approved by the Faculty of Medicine. There are two examinations for the Diploma. Part I. comprises: 1. Anatomy of the Nervous System. 2. Physiology of the Nervous System. 3. Psychology and Experimental Psychology. Part II. comprises: 1. Neuropathology. 2. Clinical Psychiatry. 3. Clinical Neurology. 4. An additional subject selected by the candidate from a prescribed list. Candidates who have held an asylum appointment for a period of five years or more may be exempted from the course of study in one or more subjects of the curriculum. New regulations are at present under consideration. Full particulars can be obtained from the Dean of the Faculty of Medicine.

University of Dublin (Trinity College)

A post-graduate diploma in Psychological Medicine is conferred upon registered medical practitioners who have held a resident medical appointment at a recognised institution for the treatment of Mental Diseases for 12 months, or who have held such an appointment for six months and have attended clinical instruction at an approved institution for six months. Candidates must also attend special courses of instruction and pass a special examination. Details can be obtained from the Registrar of the School of Physic, Trinity College, Dublin.

National University of Ireland

This University confers a diploma in Psychological Medicine; application should be made to the Registrars of the Constituent Colleges, University College, Dublin, University College, Cork, and University College, Galway, for all information.

DIPLOMA IN TROPICAL MEDICINE

Although a qualification in tropical medicine has not been made registrable by statute, a diploma is regarded as indispensable for appointments in the Colonial Medical Service and similar positions abroad. Systematic instruction for these diplomas is given at the Incorporated Liverpool School of Tropical Medicine (founded in 1898) and at the London School of Hygiene and Tropical Medicine, Keppel-street, Gower-street, London, W.C.; while the University of Edinburgh and the English Conjoint Board grant a diploma.

London School of Hygiene and Tropical Medicine

The course of instruction in tropical medicine and hygiene is divided into two parts: Section A, a three months' course in clinical and laboratory instruction, and Section B, a two months' course in tropical hygiene. Each section can be taken independently of the other, and the examinations of the Conjoint Board will follow closely upon the end of the corresponding course of study. This revised course is recognised by the University of London as a course for Associate students. The dates of the courses for the Session 1933–34 are as follows:—Section A (Clinical and Laboratory Instruction): first course, Oct. 2nd to Dec. 22nd, 1933; second course, Jan. 8th to March 29th, 1934; third course, April 9th to June 28th, 1934. Section B (Tropical Hygene): first course, Jan. 22nd to March 23rd, 1934; second course, April 23rd to June 22nd, 1934. The course of instruction under Section A includes clinical tropical medicine, applied pathology, medical zoology, and elementary bacteriology. Section B comprises instruction in tropical hygiene, including, in relation to hygiene, bacteriology, medical zoology, anthropology, and vital and medical statistics. Section A is so arranged, in three self-contained groups or blocks, as to allow of the admission of a student at the beginning of any block of work, subject to a place in the laboratory being available. Accordingly, applications can be received for admission: to the four weeks' period of study in Protozoology and Hæmatology, or the four weeks in Helminthology, or the three weeks in Entomology, with, in each case, if the student so wishes, the corresponding clinical demonstrations, instruction in applied pathology, and special lectures. Further, students wishing to attend the clinics and clinical lectures only can do so for any period of four weeks during the course. The instruction in the Division of Clinical Tropical Medicine is given by the medical staff of the Hospital for Tropical Diseases and by visiting lecturers. In this way the resources of the hospitals of the Seamen's Hospital Society at Endsleigh-gardens, at the Albert Docks, and elsewhere, become available for the clinical instruction of the students at the School.

Liverpool School of Tropical Medicine

The Liverpool University Diploma of Tropical Medicine (D.T.M.) is open only to those who have been through a full course of instruction at this school. The subjects of examination are (*a*) Parasitology, (*b*) Entomology, (*c*) Tropical Medicine, including Ætiology, Symptoms, Pathology, Diagnosis, and Treatment of Tropical Diseases. The advanced course consists entirely of Practical and Clinical Laboratory Work, given at the Laboratory at the University. Applications should be made to the Dean of the Medical Faculty, University of Liverpool.

The University also grants a diploma in Tropical Hygiene (D.T.H.). The subjects of examination are (*a*) Tropical Hygiene (including Sanitary Engineering, Vital Statistics and Epidemiology, and Applied Parasitology and Entomology). (*b*) Practical Sanitation. (*c*) Bacteriology. (*d*) Chemistry (including Meteorology and Climatology). Two University Fellowships of £100 a year each are open to students of the school, amongst others. Accommodation for research work is to be had at the University Laboratory. The Mary Kingsley Medal is awarded by the school for distinguished work in connexion with Tropical Medicine.

University of Edinburgh

Candidates for the Diploma in Tropical Medicine and Hygiene must be graduates in medicine and surgery of the University of Edinburgh or hold corresponding registrable degrees or qualifications of some other licensing body. The course of instruction, comprising a primary and a second course, is given during the autumn and spring terms, October to March, and includes Tropical Hygiene, Bacteriology, Entomology and Parasitology, Diseases of Tropical Climates (systematic and clinical), Tuberculosis, and Venereal Diseases. Provision is made in the University for instruction in all subjects.

The examinations are written, oral, and practical, and are held at the end of the courses. Candidates are required on the first occasion of presenting themselves for examination in either part to appear for all the subjects of that part. Candidates who fail to pass the entire examination in either part within a period of 12 months after first appearance are required to reappear for all the subjects. The University is included in the list of institutions whose courses of instruction in Tropical Medicine may be taken by officers on appointment to the Colonial Medical Services or during study-leave. Full particulars can be obtained from the Dean of the Faculty of Medicine.

English Conjoint Board

The Board conducts an Examination three times a year for the D.T.M. and H. granted by the Royal Colleges—namely, in January, April, and July. The Examination comprises written, oral, and practical examinations in the following subjects: *Section A*, Clinical Tropical Medicine and Surgery; applied Pathology, Zoology, and Elementary Bacteriology. *Section B*. Tropical Hygiene, including Epidemiology, Medical Zoology, and Bacteriology in relation to Hygiene. Candidates may enter for either or both Sections of the Examination provided that Section A is taken before Section B. (Candidates who are unsuccessful in Section A will not be debarred from presenting themselves for Section B.) Candidates must give 14 days' notice, in writing, to the Secretary at the Examination Hall, 8–11, Queen-square, London, W.C.1, and produce at the same time the necessary certificates of study (after Dec. 18th, 21 days' notice will be required). Candidates must produce evidence of being in possession of a registrable qualification in Medicine, Surgery, and Midwifery, and of having attended subsequently to obtaining such registrable qualification:—(i) *for admission to Section A*: Practical instruction in Pathology, Protozoology, Helminthology, Entomology, and Bacteriology in an Institution recognised for this purpose, together with the clinical practice of a hospital recognised for the study of Tropical Diseases, during not less than three months; (ii) *for admission to Section B*: Instruction in Tropical Hygiene and Sanitation in an Institution recognised for this purpose during a further period of not less than two months. Graduates (M.B., B.S., or M.D.) in Medicine and Surgery of Indian, Colonial, and foreign Universities recognised by the Examining Board in England, whose degrees are not registrable in this country, may enter for the Examination for the Diploma in Tropical Medicine and Hygiene on fulfilling the conditions in regard to study. These conditions may be modified at the discretion of the Committee of Management in the case of a candidate (*a*) who has been employed in foreign (in the case of Naval Medical Officers, one or more commissions abroad must have been held) or Colonial Medical Service, (*b*) who has been engaged in professional work in tropical countries, (*c*) who produces evidence of having been engaged in original investigations in Tropical Medicine or Hygiene. Further particulars from the Secretary, Examination Hall, Queen-square, London, W.C.1.

DIPLOMA IN OPHTHALMIC MEDICINE

Special diplomas in ophthalmic medicine and surgery are issued by two examining bodies.

University of Oxford

The diploma in ophthalmology (D.O.) is granted to registered medical practitioners after passing an examination, held annually in June, which is open to candidates who have pursued at Oxford a course of study in ophthalmology over a period of at least two months and who have attended a 12 months' course of clinical ophthalmology at a recognised hospital. Further information regarding these requirements may be obtained from the Dean of the Medical School, University Museum, Oxford.

English Conjoint Board

The Conjoint Board grants the D.O.M.S. after an examination held in two parts, twice yearly in February and July. Part I. comprises anatomy and embryology of the visual apparatus, physiology of vision, and elementary optics. Part II. comprises optical defects, ophthalmic medicine and surgery, and pathology with special reference to ophthalmology. The examination in each case is written, oral, and practical or clinical. Candidates may only enter for Part II. on completion of a year of special study of ophthalmology after obtaining a registrable diploma or a Degree in Medicine and Surgery of a University recognised by the Board.

DIPLOMA IN MEDICAL RADIOLOGY AND ELECTROLOGY

University of Cambridge

New Regulations for the D.M.R. & E. come into force in October, 1933. Before admission to any course for the Diploma a candidate shall produce evidence that he holds a medical qualification approved by the committee and also satisfy the committee that he has had sufficient post-graduate clinical experience. The next course, which begins on Oct. 4th, occupies nine months. The first four months, which can be spent either in Cambridge or in London, are occupied with (*a*) lectures and practical work in Physics, in preparation for the examination for Part I. in February, (*b*) an introductory course of clinical instruction in Radiology and Electrology, (*c*) a course of instruction in Pathology in relation to Radiology and Electrology. The next three months must be spent in London, and are occupied with (*a*) lectures and demonstrations in Radiology and Electrology (including Radium Therapy) organised by the British Institute of Radiology, (*b*) clinical instruction in the Radiological Department of a hospital approved by the committee. During the final two months of the course a candidate must hold a clinical clerkship or similar appointment in the radiological department of a hospital approved by the committee. This part of the course may be done in London, or elsewhere. The examination for Part II. will be held in July. Further particulars as to courses and examinations may be obtained from Mr. G. Stead, M.A., Secretary for the Diploma, Cavendish Laboratory, Cambridge, or the General Secretary, British Institute of Radiology, 32, Welbeck-street, W.1. Completed application forms for admission must be sent to the Secretary for the Diploma at Cambridge.

English Conjoint Board

The examination for the D.M.R., R.C.P. and S. comprises Part I. Physics, as applied to Radiology, and Part II. Medical Radiology, with special reference to its clinical application, including Radio-Diagnosis, X Ray Therapy, and Radium Therapy. Both examinations, which are written, oral, and practical, are held during June and December. The course of study extends over one academic year of full-time study, subsequent to the attainment of a recognised qualification. Before admission to the examination the following certificates must be produced. For admission to Part I. evidence of having attended a course of instruction in physics as applied to radiology at a recognised medical school or institution for not less than three months. For admission to Part II. evidence of having attended at a recognised hospital courses of instruction, theoretical and practical, in medical radiology, including radio-diagnosis, X ray therapy, and radium therapy, with clinical experience for three terms.

Candidates may enter for Parts I. and II. either together or separately, subject to the production of the required certificates; but no candidate is permitted to proceed to Part II. of the Examination until he has passed in Part I. Candidates must give 21 days' notice, in writing, of their intention to present themselves for examination, to the Secretary at the Examination Hall, 8–11, Queen-square, London, W.C.1, forwarding at the same time the necessary certificates of study. The conditions regarding admission to examination may be modified at the discretion of the Committee of Management in the case of a candidate (*a*) who has carried out original investigations in any subject of the Examination, or (*b*) whose studies have extended over a prolonged period of time without fulfilling the exact conditions. Exemption will not be granted from any part of the Examination.

University of Liverpool

Candidates before admission to the examination for the D.M.R.E. must possess a registrable qualification approved by the University in medicine and surgery, and must have attended courses of instruction in (*a*) physics (two terms), (*b*) (i) radiology, and (ii) electrology during nine months in the X ray and electrotherapeutic department of a hospital or hospitals. An examination is held in March and June (physics) and in June (radiology and electrology). Examination in either part may be taken separately. These courses commence during the first week in October. Application should be made to the Dean, Faculty of Medicine, the University of Liverpool.

University of Edinburgh

Candidates for the Diploma in Radiology (D.R. Univ. Edin.) must be graduates in medicine and surgery of the University of Edinburgh or hold corresponding registrable degrees or qualification from some other licensing body. Candidates are not admitted to the examination for the Diploma until after the lapse of not less than one year from obtaining a registrable qualification, which qualification must be registered before admission to the Examination. The course of study begins in October and extends over a period of not less than three terms. The Examination, which is written, oral, and practical, is in two parts: (*a*) Physics, and (*b*) Radiology. Full particulars may be obtained from the Dean of the Faculty of Medicine.

Radiology can be taken as the special subject in the examination for Membership of the Royal College of Physicians of Edinburgh, which means that an Honours standard has to be attained.

DIPLOMA IN LARYNGOLOGY AND OTOLOGY

English Conjoint Board

The Board grants the D.L.O. after an examination held in two parts, in June and December. Part I. comprises anatomy, embryology, and physiology of the ear, nose, pharynx, larynx, trachea and bronchi, and œsophagus. Part II. comprises the medicine, surgery, and pathology of the ear, nose, pharynx, larynx, trachea and bronchi, and œsophagus, and the recognition and use of special instruments and appliances. The examination in each case is written, oral, and practical or clinical. Candidates may only enter for Part II. on completion of one year of special study of the diseases of the ear, nose, pharynx, and larynx, after obtaining a registrable qualification, or a degree in medicine and surgery of a University recognised by the Board.

DIPLOMA IN TUBERCULOUS DISEASES

University of Wales

The regulations governing the award of the diploma of T.D.D. prescribe that every candidate must have obtained a registrable qualification in Medicine, Surgery, and Midwifery for at least two years before he can be admitted to the examination. He must have held, for not less than 12 months, a resident medical or surgical appointment on the staff of a Tuberculosis Hospital or Sanatorium, or at an Orthopædic Institution providing not less than one hundred beds for cases of surgical tuberculosis; or shall satisfy the Faculty of Medicine that he has pursued a special study of Tuberculosis equivalent to the above for a period of not less than 12 months. Every candidate must have pursued a course of instruction in the epidemiology, pathology, and bacteriology of tuberculosis extending over one term in the Welsh National School of Medicine, or an equivalent course of instruction extending over at least the same period in an institution approved by the University for this purpose. The examination is held annually in the first week of June. Notice of candidature, together with the entrance fee of £10 10*s*., and the necessary certificates, must be forwarded to the Registrar of the University, University Registry, Cathays Park, Cardiff, not later than May 1st.

The *Cecil Prosser Research Scholarship*, of the value of £250 for one year, is awarded triennially for research in Tuberculosis.

DIPLOMA IN BACTERIOLOGY

University of London

The University of London grants an Academic Diploma in Bacteriology, the Course being open to (*a*) Graduates in Medicine, Science and Pharmacy of this or another approved University, whose previous training has, in the opinion of the University, fitted them to profit by the Course; and (*b*) registered medical practitioners and other students who, though not graduates, have obtained a qualification and undergone a previous training which, in the opinion of the University, has fitted them to profit by the Course.

A Course necessary to fulfil the regulations of this Diploma has been planned by the London School of Hygiene and Tropical Medicine, Keppel-street, London, W.C., and full particulars with regard to the Diploma may be obtained from the Academic Registrar, University of London, South Kensington, S.W.

DIPLOMA IN CLINICAL PATHOLOGY

University of London

The course of study for the Academic Diploma in Clinical Pathology extends over one calendar year, and is open to graduates in Medicine and to registered medical practitioners. The subjects are (1) Morbid Anatomy and Histology; (2) Bacteriology and Serology; (3) Biochemistry. The Examination is held in December.

DENTAL SURGERY

TEACHING INSTITUTIONS IN DENTISTRY

REGISTRATION on the Medical Register entitles a practitioner to practise dentistry, although he cannot register as such without degree or licence in dentistry; but few dental appointments at general or special hospitals or dispensaries are available save to those with a special diploma, and, until registered on the Dentists Register, no dental work under the Additional Benefit Scheme of the National Health Insurance Act can be undertaken.

The Examining Bodies in Dentistry which grant degrees and diplomas in the subject are as follows: Royal College of Surgeons of England, Royal College of Surgeons, Edinburgh, Royal Faculty of Physicians and Surgeons of Glasgow, Royal College of Surgeons in Ireland, and the following Universities: Birmingham, Bristol, Durham, Leeds, Liverpool, London, Manchester, Sheffield, St. Andrews, Dublin (Trinity College), Queen's University of Belfast, and the National University of Ireland. The student should apply to the secretaries of the various Conjoint Boards or to the Deans of the medical faculties or medical schools for a syllabus.

TEACHING INSTITUTIONS IN LONDON

Royal Dental Hospital

The Royal Dental Hospital of London, School of Dental Surgery, Leicester-square, is a school of the University of London. The school provides the special dental education required by the University of London for the B.D.S. Degree and the Royal College of Surgeons for the Licence in Dental Surgery. The general part of the curriculum may be taken at any general hospital. The hospital is open from 9 A.M. to 6 P.M., there being one staff for the morning and another for the afternoon of each day. Pupils are received for the training in dental mechanics recognised by the curriculum. The instructors at the commencement of each session give a course of lectures on Operative Dental Surgery. The two senior house surgeoncies and the six house surgeoncies are held for four months each and are open to all qualified students. The lecturers, in addition to their lectures, give special demonstrations on the Microscopy of Dental Anatomy and Dental Surgery. The lecturer on Dental Mechanics also gives practical demonstrations in the laboratory. There is an Entrance Scholarship in Chemistry and Physics of the value of £25. One Scholarship in Dental Mechanics and Metallurgy, value £25. For full information as to scholarships and prizes, and other matters connected with the course, application should be made to the Dean.

University College Hospital Dental School

This Hospital and School, situated at the corner of Great Portland and Devonshire-streets, W., has recently been thoroughly reorganised, and is now fully equipped with all the most modern appliances. Students are entered as students of University College Hospital, and, as such, attend the classes of Anatomy and Physiology in University College, which is a few minutes' walk from the Dental Department in Great Portland-street, hitherto known as the *National Dental Hospital*. The first Dental School to admit Women Students. Practical courses to comply with the R.C.S. curriculum are held. Clinical Lectures and Demonstrations are given, and each student on entering passes through a preliminary course under a demonstrator. A prospectus containing full information as to lectures, fees, and prizes may be had on application to the Sub-Dean for Dental Students, who attends at University College Hospital Medical School, University-street, W.C.1, on Wednesday mornings from 9.30 to 10.30, and at other times by appointment.

Guy's Hospital Dental School

The work of the Dental Department begins daily at 9 A.M. both in the extraction rooms and in the conservation room. The Extraction Rooms: These rooms have now been entirely reconstructed. There is ample accommodation for both general and local anæsthetic extractions, together with waiting- and retiring-rooms. Patients are admitted between 8.45 and 9.30 A.M., and are seen by the dental surgeon for the day, the staff demonstrators, the dental house surgeons, and the dressers. The Conservation Room is open from 9 A.M. till 5 P.M., and is under the charge of the Director. It affords accommodation for about 100 dental chairs, with the necessary equipment of the most modern type for the use of the Dressers, who, under the supervision of the Staff, perform the various operations of Dental Surgery. There is a separate room for denture patients affording accommodation for 15 chairs and a separate department for children with accommodation for 20 chairs. The Members of the staff attend every morning and afternoon to give demonstrations and otherwise assist students in their work in the Conservation Room and Prosthetic Laboratory. The Probationers' Laboratory is supervised by the Director of the Conservation Room assisted by the Staff Demonstrators, and instruction is given in operative dentistry on a "mannikin" to students during their first three months of clinical study. Students in Dental Prosthetics are received, and a graded, systematic, and full course of instruction, extending over two years, is carried out under the supervision of the Director of the Prosthetic Laboratory, assisted by four demonstrators, a house surgeon, and skilled mechanics.

Dental students have the opportunity of attending at this hospital the whole course of instruction required by the examining board for the B.D.S. Lond. or L.D.S. Eng.—viz., the complete course in dental prosthetics, the special lectures and practice of the Dental Department, and the general lectures and practice of the Medical School. Students who enter for a medical as well as a dental course are allowed to pursue their study of Dentistry during any period of their medical course most convenient to themselves without further charge.

Twelve house surgeons, 20 assistant house surgeons, and four student demonstrators of Dental Histology are appointed annually. The following appointments are held by students: Full surgeon's dresser, assistant surgeon's dresser, dresser in the children's department, casualty dresser, probationary dresser, clerk to the anæsthetist and dresser in the general anæsthetic and local anæsthetic rooms. The school offers a War Memorial Entrance Scholarship (£40); a Science Scholarship (£40); a confined Epsom College Scholarship; and a Travelling Scholarship. Further information will be supplied by the Dean of the Medical School.

King's College Hospital

The Dental School is part of the Medical School of King's College Hospital, and was opened in November, 1923. The Dental Out-patient Department of the Hospital is used for the performance of dental extractions. A large Conservation Room with provision for 40 dental chairs has been equipped. Smaller rooms are used for clinical teaching and administrative requirements, and a specially equipped laboratory for training in the art of dental mechanics. An X ray apparatus has been installed for use in dental skiagraphy. The Dental museum contains a large number of specimens illustrating oral, buccal, dental, and other diseases. The library, lecture theatre, lecture rooms, common rooms, and the refectory are all available for the use of students. Courses of study, including practical work, are provided for the degree of Bachelor of Dental Surgery of the University of London, and for the Diploma in Dental Surgery of the Royal College of Surgeons of England. Special arrangements are made for those students who wish to take a medical degree or qualification in addition to a degree or diploma in Dental Surgery.

The following salaried appointments are open to qualified members of the School: Registrar, Resident House Surgeon, Non-Resident House Surgeon, and Tutors in Dental Mechanics, Operative Dental Surgery, and Dental Materia Medica.

Full particulars of the Dental School may be obtained on application to the Dean, or to the Secretary of the Medical School, King's College Hospital, Denmark Hill, London, S.E.5.

London Hospital

This school is a part of the London Hospital and Medical College, and is fully equipped on the most modern lines and with the latest appliances. It provides a complete curriculum in all subjects for the B.D.S. Degree and for the L.D.S. Diploma, and is admirably adapted for the purpose of teaching. The Conservation Room is well lighted and ventilated, and fitted with pump chairs of the latest pattern; the fountain spittoons at many of the chairs have been specially designed. Each spittoon has attached to it a saliva ejector, hot and cold water, compressed air, gas and electric current, also a swing bracket to carry the student's cabinet. Electric sterilisers are supplied in each department and motor engines where required. The school possesses, in addition to the Theatres, Laboratories and Museums in the College, a special Museum of Dental Anatomy and Surgery, Operative Dentistry, Prosthetic and Extraction Rooms, an X Ray Room, and Laboratories for Practical Metallurgy and Prosthesis. A systematic course of instruction is arranged for pupils. The up-to-date Laboratory contains every modern apparatus, and is in charge of a skilled curator and his assistants. Entrance Scholarship: Francis Farmer Entrance Scholarship in Science, value £25; no age limit. Subjects: Chemistry and Physics. Prizes: The Harold Fink Prize in Operative Dental Surgery, value £8 8s.; the "London" Prize in Dental Prosthesis, value £6 6s. Prizes are also offered for competition at the end of each of the courses of lectures in the curriculum. Connected with the Medical College and Dental School are a Library, Athenæum, Clubs' Union, Dining Hall with moderate tariff, Students' Hostel, and an Athletic Ground. For full particulars as to Scholarships and Prizes, fees and course of study advised, apply to the Dean of the Medical School.

TEACHING INSTITUTIONS OUTSIDE LONDON

Birmingham Dental Hospital

The Dental Hospital in Great Charles-street has accommodation for 100 students. The equipment is in accordance with the most modern requirements for the efficient teaching and practice of Dental Surgery, including Radiology and a department for Practical Pathology and Bacteriology. The hospital, both internally and externally, has been renovated, and several departments have been reconstructed. The operations performed annually average 61,000, including gold and other fillings, crowns, bridges, porcelain inlays, and injections for block and infiltration anæsthesia. The orthodontic department is one of the foremost in the country. The Prosthetic and Mechanical Department is large and well lighted and under a highly skilled instructor who is always present. Application for information as to fees and scholarships must be sent to the Dean of the Medical Faculty, Birmingham University, or the Dean of the Dental Hospital, Birmingham.

Leeds University School of Dentistry

The School of Dentistry is adequately equipped to provide for the complete training of the dental student. It forms a part of the Leeds School of Medicine whilst the instruction in clinical and mechanical dentistry is carried out in the Dental Hospital. The School is now in occupation of a spacious new building especially designed to the requirements of modern dental teaching. The School is also the dental department of the General Infirmary, and its close association with the work of that institution ensures an adequate supply of clinical material, and enables a fuller insight into the position dental surgery holds in relation to general medicine and surgery, especially with regard to the major diseases and injuries of the head and neck. The courses of study are mainly designed to meet the requirements of the B.Ch.D. and L.D.S. Leeds, but every opportunity is afforded to students preparing for the degrees or diplomas of other licensing bodies. Full-time demonstrators give the instruction in clinical dental surgery, prosthetic dentistry, and mechanics, which is carried out under the supervision and direction of the Professor of Clinical Dental Surgery and members of the Honorary Staff. Special facilities are provided for instruction in Orthodontia, Radiography, Local and General Anæsthetics, and Bacteriology. Prizes are offered for competition to pupils and students in their respective years of study. Communications should be addressed to the Warden, School of Dentistry, Leeds, from whom a prospectus may be obtained.

Victoria University of Manchester School of Dental Surgery

Courses of study are provided to meet the requirements for the B.D.S. Degree, and the L.D.S. Diploma of the University of Manchester, and for the L.D.S. Diploma of the Royal College of Surgeons of England. At the Dental Hospital instruction is given in practical Dental Mechanics, Operative Dentistry, Diagnosis and Extraction, Orthodontics, Dental Prosthetics, Anæsthetics, and Radiography by specially appointed Clinical Teachers. All the courses of instruction are open to women students. Copies of the prospectus may be obtained on application to the Dean.

Newcastle-upon-Tyne Dental Hospital and Sutherland Dental School

This institution is a component part of, and constitutes the Dental Department in, the University of Durham College of Medicine. A new dental hospital, erected within the grounds of the Royal Victoria Infirmary and equipped with the most modern apparatus, was opened in 1932, and it is possible to undertake the whole of the dental curriculum—i.e., systematic lectures, dental and general hospital practice, together with the mechanical pupilage—at the College. The Dental Board of the

United Kingdom recognises the school for the purpose of granting its bursaries to students who are able to comply with the conditions laid down by the Board. The composition fees payable by dental students are £90 for all systematic lectures and laboratory work at the College for the B.D.S. (or £85 for the L.D.S.), £50 for dental hospital practice for B.D.S. (or £40 for L.D.S.), £16 16*s.* for general hospital practice, and £80 for mechanical pupilage. A dental prospectus and any other information may be obtained from the Dean, University of Durham College of Medicine, Newcastle-upon-Tyne.

SCOTTISH TEACHING INSTITUTIONS

Edinburgh Dental Hospital and School

The Edinburgh Dental Hospital and School is located in spacious and well-equipped buildings at 30, 31, and 32, Chambers-street, and offers special advantages to dental students. The General Courses required for the Dental Diploma may be taken in the Medical School of the Royal Colleges of Physicians and Surgeons or in the University schools. The general hospital attendance and clinical instruction are taken at the Royal Infirmary. The University, Medical Schools, and Royal Infirmary are within three minutes' walk of the Dental Hospital. The special courses are taken in the hospital. The Dental Hospital practice, extending over two years, affords a student ample opportunity for a full acquaintance with every branch of dentistry. The hospital admits a limited number of indentured pupils. They receive their instruction in Mechanical Dentistry concurrently with the general and special courses. A premium of 60 guineas is payable with each such pupil. The practice and lectures of the hospital are recognised by, and qualify for, all the Licensing Boards. Those students who desire to take a Medical and Surgical Diploma in addition to the L.D.S. have in this school admirable facilities for so doing. The triple qualification of the Royal College of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow is recommended. The Higher Dental Diploma (H.D.D.) of the Royal College of Surgeons affords an opportunity of obtaining a higher qualification subsequent to registration. The Prospectus, with full information, may be obtained by application to the Dean or the Assistant Secretary.

Incorporated Glasgow Dental Hospital

This hospital is located at 211, Renfrew-street, Glasgow. The school is open to Men and Women Students, and Lectures are given on Dental Surgery, Operative Dental Surgery, Orthodontia, Dental Anatomy and Physiology, Dental Histology, Dental Mechanics, Crown and Bridge work, Dental Metallurgy, Dental Bacteriology, Radiology, Anæsthetics, and Dental Materia Medica. Lectures on general subjects required for Dentistry may be taken at the University or at one of the extramural schools where special provision is made for Dental Students. The new Dental Hospital is now open and is equipped with all the modern methods for teaching students. Post-graduate courses will be inaugurated during the coming winter.

Glasgow Royal Infirmary

Dental Department: The following course in the curriculum can be taken at St. Mungo's College: Anatomy, six months; Practical Anatomy, nine months; Physiology, six months; Chemistry, six months; Practical Chemistry, three months; Surgery, six months; Medicine, six months; Materia Medica, three months. Clinical Medicine (three months) and Clinical Surgery (six months) are taken at the Royal Infirmary.

IRELAND

Dental Hospital of Ireland

All Dental Students who have passed their Second Dental Examination in the Royal College of Surgeons in Ireland (or an equivalent examination or examinations) are admissible to the Clinical Instruction of the Hospital. In addition to Clinical Instruction and Special Demonstrations, courses of lectures are given at the hospital on Dental Surgery and Pathology, Mechanical Dentistry, the Administration of Anæsthetics, Orthodontia, Dental Anatomy, and Dental Materia Medica, and instruction in Anæsthetics. The course in practical Dental Mechanics can be taken in the Hospital Laboratory. Post-graduate courses are given in Orthodontics. Further particulars can be obtained from the Dean, at Lincoln-place, Dublin.

PHARMACEUTICAL SOCIETY

THE SCHOOL OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN is recognised by the University of London. The Society conducts examinations for registration as (*a*) Chemist and Druggist and (*b*) Pharmaceutical Chemist. Courses of Instruction are given for these examinations, in the latter case in conjunction with University College.

An Intercollegiate two years' course for the Final Examination for the degree of B.Pharm. of the University of London is also given in conjunction with University College. Medical students are admitted to the lectures and laboratory work in any or all the courses. Certificates of instruction in the School are received by the Conjoint Board of the Royal Colleges and by the University of London. Graduates of approved Universities may carry out the research work necessary for the thesis for the Ph.D. of the University of London in the Society's Research Laboratories; this degree may now be taken in Pharmacognosy or Pharmacy in the Faculty of Medicine. Several scholarships are also offered. Further information may be obtained from the Dean, 17, Bloomsbury-square, London.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 12TH, 1933

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 5 (last week 10); scarlet fever, 1519; diphtheria, 621; enteric fever, 42; acute pneumonia (primary or influenzal), 413; puerperal fever, 39; puerperal pyrexia, 93; cerebro-spinal fever, 23; acute poliomyelitis, 16; encephalitis lethargica, 7; dysentery, 12; ophthalmia neonatorum, 71. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on August 15th–16th was as follows:—Small-pox, 23 under treatment, 2 under observation (last week 19 and 2 respectively); scarlet fever, 1715; diphtheria, 1514; enteric fever, 10; measles, 578; whooping-cough, 346; puerperal fever, 21 mothers (plus 8 babies); encephalitis lethargica, 253; poliomyelitis, 1; "other diseases," 187. At St. Margaret's Hospital there were 15 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 3 (0) from enteric fever, 12 (3) from measles, 7 (0) from scarlet fever. 14 (3) from whooping-cough, 25 (5) from diphtheria, 66 (14) from diarrhœa and enteritis under 2 years, and 8 (0) from influenza. The figures in parentheses are those for London itself.

Measles was fatal in 3 cases at Liverpool; whooping-cough in 4 cases at Liverpool and 2 at Portsmouth. Of the deaths from diarrhœa outside London, 8 were reported from Liverpool, 5 from Leeds, 4 from Birmingham, 3 each from Hull and Manchester, 2 each from Halifax, Sheffield, Warrington, Nottingham, Stoke-on-Trent, Walsall, and Cardiff.

The number of stillbirths notified during the week was 280 (corresponding to a rate of 52 per 1000 total births), including 45 in London.

OBITUARY

ARTHUR W. J. MacFADDEN, C.B., M.B., C.M. Edin., D.P.H. Camb.

LATE SENIOR MEDICAL OFFICER, MINISTRY OF HEALTH

WE regret to announce the sudden death of Dr. MacFadden, which occurred on August 16th at his home in Hampstead.

Arthur William James MacFadden was born in 1869, and was the eldest son of Mr. James MacFadden, of Portadown, Armagh. He was educated at Lurgan College, Armagh, and received his medical training at the University of Edinburgh, Queen's College, Belfast, and University College, London. He graduated M.B., C.M. Edin. in 1893, and having decided to engage in public health work was appointed assistant medical officer at Brighton, and later was medical officer of health to the Edmonton Urban District, whence, in 1906, he joined the Local Government Board as inspector of foods.

The whole of MacFadden's official life was concerned with the administrative work of the special department of the Local Government Board, established to supervise the food-supplies of the country. On his appointment to the Board he was attached to this department, which had only been formed the previous year (1905). In 1911 he succeeded Dr. (now Sir George) Buchanan as chief inspector of foods, and later became a senior medical officer on the formation of the Ministry of Health. In the early years of his association with the department, MacFadden, though much occupied with the heavy work involved in connexion with the administration of the Sale of Food and Drugs Acts, and the organisation of inspection of foods—particularly at ports, under regulations made under the Public Health (Regulations as to Food) Act, 1907—found time to prepare and publish special reports, for example, on contamination of tartaric acid, citric acid, and cream of tartar by lead and arsenic; on the wholesomeness of tripe from home and foreign sources; and on preservatives in meat foods packed in cans or glass. But after his appointment as chief inspector of foods he was so occupied with office work in the administration of his department that the preparation of special reports was not possible. A record of the work, however, appeared in the annual statements which he furnished each year for inclusion in the annual report of the chief medical officer of the Local Government Board, and many of these have been noticed in our columns. They indicate the wide range of matters with which he had to deal, and the vigilance exercised to discover early and act promptly with regard to any menace to public health through the medium of foods. The routine supervision of the administration of the Sale of Food and Drugs Acts and of the inspections made at ports, and elsewhere, to deal with unsound foods, was recorded each year, and from time to time there appeared interesting references to such subjects as: Chinese pork and bacon; boneless meat; onchocerciasis; inedible fat; liquid eggs; bleaching of flour; arsenic in baking powders; preservatives in milk or cream. Such items remind us of problems dealt with successfully by MacFadden and his staff. The important question of milk-supply was constantly in his mind, and he gave much consideration to such matters as the use of condensed and dried milks in infant feeding; pasteurisation of milk; milk and cream regulations; and milk grading. He was naturally keenly interested in the question of outbreaks of bacterial food poisoning and was constantly on the alert for information on such occurrences with a view to thorough investigation. In 1911 a special memorandum was issued, mainly for the information of medical officers of health, as to the measures to be taken promptly on the occurrence of cases of food poisoning in a district, and offering the assistance of the Board's officers in the investigation of material suspected to be concerned.

During the war MacFadden organised a system of special supervision over the preparation of food-supplies for the Army, and two medical officers of his staff were lent to the War Office and sent to Chicago and Buenos Ayres to supervise the carrying out of Army meat contracts. MacFadden also served on several interdepartmental and other committees concerned with the food-supply of the country during the war. His services in these and other directions were extremely valuable and highly appreciated by the Army authorities. He was created C.B. in 1916.

Dr. Francis Coutts writes: "It was with deep regret that I heard of the death of my old friend and colleague, Dr. A. W. J. MacFadden. Our long association at the Local Government Board and Ministry of Health afforded me ample opportunity to realise and appreciate his zeal and devotion to the cause of public health, the efficiency of his work, and the charm of manner and easy courtesy which not only endeared him to his colleagues, but added to his usefulness in the public service; they enabled him to carry out, successfully and without friction, prolonged and difficult negotiations with representatives of important trading concerns whose financial interests were often involved in measures proposed for the protection of the public. The increasing complexity of modern life, the ever-expanding developments made possible by modern science in the preservation, storage, and transport of foods from distant countries, and the ingenious use of chemical compounds in the preparation of foodstuffs increase the need for adequate supervision to control the purity of food-supplies and to maintain their quality. The fact that the food-supply of the country is now probably more adequate, more varied, and more free from risk to the health of the community than ever before speaks well for the work of MacFadden and his department. Whilst determined to protect the consumer from risks due to unsound or adulterated food, MacFadden recognised that control needs to be wisely applied so as not to interfere unnecessarily with legitimate industry or unduly raise the cost of food. He was, therefore, always willing to discuss, in a friendly manner, with the trades concerned to ensure as far as possible that the measures proposed, whilst protecting the public, should not unduly hamper the trader. In such conferences his tact, persuasiveness, and courteous manner went far in securing satisfactory arrangements. With his colleagues he worked in perfect harmony, and his loss will long be deplored."

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL.—The following note should have been made in its appropriate place in this issue: The Medical Library contains 7000 bound volumes in addition to the medical and scientific periodicals. There are good facilities for quiet reading and books are lent for use at home. The new Pathological Museum was opened last July and is being arranged in accordance with the latest practice so as to render proper service to the tutorial system.

RADIUM AT GREAT ORMOND-STREET.—The Hospital for Sick Children has no supply of radium and is compelled to borrow it on the frequent occasions when it is needed. An appeal for £1000 for the purchase of a sufficient supply has, so far, produced £269. When £900 has been subscribed a donor will give the final £100.

NOTES, COMMENTS, AND ABSTRACTS

EXAMINERS AND EXAMINEES

An address was delivered before the St. Mary's Hospital Medical Society in May last by Dr. Reginald Miller, and published at the time in the *St. Mary's Hospital Gazette*, in which he discussed the existing examination system in wise and humorous fashion. His words have particular application at this juncture, when our new recruits are standing at the threshold of their examinational agonies. Asking his student audience to agree with him that that system is pestilential, and agreeing that superior knowledge or better brains play only a part in allotting to the candidate success or failure—a substantial share in either result being played by luck—the speaker found none the less, that the system must proceed inasmuch as there was nothing to replace it, while it was necessary to ascertain how far the student was fitted for qualification.

Dr. Miller described in detail the methods devised by the late Sir Frederick Hallett to secure for examinees at the English Conjoint Board a fair hearing—methods which have met with the fine testimonial of wide imitation. He gave the impression that on the whole examiners are a patient race, who discharge their duties kindly and who deserve from the examinees, usually described as their victims, but who figure here, rather, as their charges, the reliefs to a wearisome task afforded by audible answers and frank confessions of ignorance. The chief defect of some examiners Dr. Miller found to be over-punctiliousness as evidenced by the waste of time in order to secure an answer in particular terms. "A candidate," he said, "will describe an apex-beat as forceful, thrusting, exaggerated, or as indicating hypertrophy: and the examiner will have none of it. They beat about the bush until the word 'heaving' is used and then peace is restored. This is all very correct and proper, but perhaps two minutes out of the ten have been spent on it. It seems hardly worth it and is upsetting to the candidate. I grant that the good candidate will from the first use the word 'heaving,' but if he does not, it is surely better to let him run on and say what the significance of the phenomenon is, by whatever name he calls it." Everyone will recognise the kind of cross-examiner who is here depicted. In the law-courts his methods may be justified, for the issues may be concerned with matters in which the witness is only secondarily interested, but which are of vital importance to others. In examination for diplomas such behaviour may lead to the unjust discomfiture of the examinee, while no one but he is concerned with his fate.

Dr. Miller's remarks on the written examinations should certainly be taken to heart by many examiners, judging from the specimens of questions that have been set at different times to unfortunate students—not, we may say, at the examinations of the Conjoint Board, where the papers are set at a meeting of the board of examiners and great pains are taken in framing them. We do not know if he was criticising any particular examinational methods, but undoubtedly students have often justification in complaining of the questions placed before them, and find their teachers to uphold their complaints. But the system of marks employed at the Conjoint Examination, as set out by Dr. Miller, will strike everyone as remarkably fair. No examiner knows what marks the candidate has obtained in other sections of the examination, while to marks obtained above the pass mark high value is given, allowance being made here for examinees who have been nervous or muddled. "I hope from what I have said," are Dr. Miller's words, "that you will agree that in every way the Conjoint system of examining is as fair as human ingenuity can make it. Each candidate gets a good run for his money, or his father's money, as the case may be. I think it is its fairness that makes it so popular as a final examination, and there is ample proof of its popularity. If a gentleman takes the trouble to go up for surgery 25 times (which I understand is the present record) it must be allowed that there is something in it which appeals to him. The medicine final is not so popular: seven or eight attempts, and there is a suspicion that the thing is turning into a morbid habit."

Turning to the examinees at the Conjoint Board, Dr. Miller is not complimentary to their preliminary education as a whole. They are, he says, a diverse lot, though not perhaps as diverse as their spelling, at which the medical student seems to reach a level of originality so high that after reading examination papers no examiner can spell for a fortnight. "It is rare," he says, "to read a paper which in caligraphy, expression, neatness or arrangement is even respectable, while too many candidates neglect the precaution of reading over their papers before handing them in, and the omission of a little word like 'not' may make a good deal of difference. Now the examiner has to read what is written." The clinical examination he finds the candidate's greatest test, and here the general medical training of his mind, his knowledge of his work, his common sense and shrewdness should all come in.

Dr. Miller's general picture of the situation is very interesting.

TEACHING METHODS IN MEDICINE[1]

UNDER this title Dr. William Duncan Reid, assistant professor of cardiology at the Boston University medical school, applies in a wise little book, "the philosophy of contemporary education to medical schools." In other words, he asks what the medical teacher can do for the students that is most effective, and whether there is any importance in the reiterated statement that there is no formal course in medicine for the training of the teachers. The book is thoroughly interesting. Its various messages cannot be conveyed fairly in fewer words than those in which they are delivered, so that anything like a review of such concentrated matter is impossible. But it is possible to say that here is a bright light thrown on many of the difficulties which surround the subject of medical education with us as with the Americans. Implying that teachers of medicine ought themselves to be taught, Dr. Reid analyses the curriculum in 48 medical schools in the United States, and quotes the criticisms published six years ago by an American Commission on the subject. These criticisms he analyses down to the following two points—overcrowding of the curriculum, and a lack of bearing sufficiently direct upon the future practice of medicine. To go no further than this, it becomes evident that in such circumstances the methods of teaching are not fully effective.

A short note on the psychology of learning is followed by a series of chapters on what is termed "the technics of teaching." Every separate technic, the author says, forms a teaching which should in general meet the following requirements: it should rest upon psychological law; it should square with recognised principles of education; and it should be a profitable procedure. He classifies the technics in three groups, somewhat arbitrarily, as major, minor, and general, of which the first comprises the more fundamental methods of teaching. He dwells on the real necessity of drill, when it is desired to produce automatic results in the student, so that response becomes habitual; but here the ingenuity of the teacher is taxed because it is necessary to inculcate in the student the wish to form desirable habits. This is to be brought about by the reduction to a sizable load of the material to be learned and by proper organisation and direction of the teaching, so that the subject can be really mastered, and not only talked about. As matters of secondary or tertiary importance come the following counsels. The student should be helped to understand exactly what he is expected to do; his reading should be supervised so that he may acquire the habit of discriminating between fact and theory; and he should learn by making outlines of his lessons the immediate use of the facts required and their connexion with what has been already learned. Of questioning by the teacher, Dr. Reid says that "to question well is to teach well"; that it is a ready means of ascertaining whether a pupil has done that which he was told to do, and if he understands what he has done, but the good teacher can get more than this out of "quizes," for he can change a recitation by the student from a string of facts into an exercise of active thinking. Of lecturing Dr. Reid says sound things, by no means accepting the familiar definition that "it is a bad habit of college professors." Employed to excess it becomes an abuse, but a lecturer who can hold his audience by his personality, emphasising important points and explaining those that are likely to be misunderstood, is a pillar of strength in an educational system. And of examinations Dr. Reid utters the wise caution that they should be used with awareness of their limitations.

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[1] By W. D. Reid, A.B., M.D., F.A.C.P. Obtainable from the author, $1.00 per copy, 510, Commonwealth-avenue, Boston, Massachusetts.

In a second part of the book the author suggests a plan for the organisation of the medical curriculum, in which he expresses his indebtedness in drawing up the items to a group of medical teachers. This section of the book is more particularly addressed to an American audience.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdr. (retd.) J. F. Ainley to be Surg. Capt. (retd.).

Surg. Comdr. T. Cock is placed on the retd. list.

Surg. Lt. P. B. Jackson to be Surg. Lt.-Comdr.

Surg. Comdrs. J. F. H. Gaussen to *President* for post-graduate course, and R. J. Inman to *Vivid* for R.N.B., Devonport.

ARMY MEDICAL SERVICES

Lt.-Col. G. S. Wallace, R.A.M.C., to be Bt.-Col.

ROYAL ARMY MEDICAL CORPS

Lt.-Col. A. M. Rose, having attained the age for compulsory retirement, is placed on retd. pay.

Majs. G. G. Collet and E. W. Vaughan to be Lt.-Cols.

The undermentioned to be Lts. (on prob.): D. M. Ahern, W. F. L. Fava, P. H. Peacock, R. W. Scott, and J. D. P. Macpherson.

Vacancies

For further information refer to the advertisement columns

[illegible] —Res. M.O. At rate of £110.

[illegible] *Diseases, Austral-street,* [illegible] At rate of £100.

[illegible] *tal, Church-street.*—H.S. At rate of £130.

[illegible] *Throat Hospital.*—Third H.S. At rate of £50.

[illegible] *dsworth Common.*—Res. M.O. £200.

[illegible] *unty Hospital.*—Hon. Physician.

[illegible] Sen. Res. M.O. £200.

[illegible] *Hospital.*—Res. Anæsthetist and [illegible] At rate of £130.

Cardiff, [illegible] *School of Medicine.*—Jun. Asst. in the Med. Unit. £250.

Chelmsford and Essex Hospital and Dispensary, London-road.—Res. M.O. £150.

Connaught Hospital, E.—Hon. Physician.

Coventry and Warwickshire Hospital—Res. H.P. £160.

Derbyshire County Council, Bretby Hall Orthopædic Hospital.—Locum Res. Asst. M.O. At rate of £350.

Dreadnought Hospital, Greenwich, S.E.—H.P. and H.S. Each at rate of £110.

Evelina Hospital for Sick Children, Southwark, S.E.—H.S. At rate of £120.

Hospital for Tropical Diseases, Endsleigh-gardens, W.C.—Two H.P.'s. Each at rate of £120.

Ilford, King George Hospital.—H.S. At rate of £100.

Imperic [illegible] *Ltd.*—Physiologist. £600.

Ipswich [illegible] *ich Hospital.*—H.S. £120.

Leicestc [illegible] 's, H.P.'s, and Cas. O.'s. Each at [illegible]

Leigh Infirmary, Lancs.—Res. H.S. At rate of £175.

Lincoln, Bracebridge Mental Hospital.—Third Asst. M.O. £350.

Liverpool and District Hospital for Diseases of the Heart.—H.P. At rate of £100.

Liverpool Sanatorium, Delamere Forest, Frodsham.—Asst. to the Med. Supt. £250.

London Lock Hospital, Dean-street, Soho.—Res. M.O. At rate of £175.

Manchester Babies' Hospital, Burrage-lane, Levenshulme.—Sen. Res. M.O. At rate of £125.

Manchester Royal Children's Hospital, Gartside-street.—Two Asst. M.O.'s for Out-patients' Dept. Each at rate of £150.

Manchester, St. Mary's Hospital.—H.S. for Whitworth Park Hospital. At rate of £50.

Middlesbrough, North Riding Infirmary.—Sen. H.S. At rate of £200.

Miller General Hospital, Greenwich-road, S.E.—H.S. and H.P. Each at rate of £100.

Newcastle General Hospital.—Two H.P.'s and One H.S. Each at rate of £150.

Newport, Public Assistance Institution.—Sen. and Jun. M.O.'s £350 and £150 respectively.

Northampton General Hospital.—H.P., Two H.S.'s, and H.S. to the Ear, Nose and Throat Dept. Each at rate of £150.

Norwich, Norfolk and Norwich Hospital.—Cas. O. and H.S. £120.

[illegible] *Hospital.*—Second Asst. M.O. £400.

[illegible] *and County Hospital.*—Res. Surg. O., [illegible] Obstetric H.P. Each £200.

Preston and County of Lancaster Royal Infirmary.—H.P., H.S., and Cas. O. Each at rate of £150.

Prince of Wales's General Hospital, N.—Jun. and Sen. H.P.'s and H.S.'s. At rate of £90 and £120 respectively.

Princess Beatrice Hospital, Richmond-road, Earl's-court, S.W.—Res. M.O. At rate of £110.

Radium Institute, Riding House-street, W.—Res. Surg. Reg. At rate of £250.

Royal Colleg [illegible] r.

Royal Eye [illegible] H.S. and Asst. H.S. [illegible]

Royal National Orthopædic Hospital, 234 Gt. Portland-street, W.—Two H.S.'s. Each at rate of £150.

Royal Northern Hospital, Holloway, N.—H.S. At rate of £70.

St. Peter's Hospital for Stone, Henrietta-street, W.C.—H.S. At rate of £75.

Salford Royal Hospital.—H.P., Two H.S.'s, and Cas. H.S. Each at rate of £125.

Sheffield Royal Infirmary.—Clin. Asst. to the Med. Dept. £300.

Shrewsbury, Royal Salop Infirmary.—Cas. O. and Res. Anæsthetist. At rate of £160.

[illegible] Res. M.O. At rate of £150.

[illegible] *Home, Parkwood.*—Res. [illegible]

Swansea, Infectious Diseases Hospital.—Res. M.O. £350.

Wakefield, West Riding County Council.—School Oculist. £600.

Walsall, Manor Hospital.—Jun. Res. Asst. M.O. £150.

Weir [illegible] Jun. Res. M.O. £150.

West [illegible] *W.*—H.P., H.S. Also [illegible] Each at rate of £100.

Westr [illegible] —Hon. Anæsthetist.

Wind [illegible] S. At rate of £100.

Wrexi [illegible] *Memorial Hospital.*—Res. H.S. At rate of £150.

The *Chief Inspector of Factories* announces a vacancy for a Certifying Factory Surgeon at Porlock (Somerset).

Appointments

London County Council.—The following appointments to general and special hospitals are announced. A.M.O. (I) and (II) =assistant medical officer (Grades I and II).

ALSTON, J. M., M.B., M.R.C.P.Ed., Pathologist, Archway Hosp.

ARMSTRONG, J. V., M.D., D.P.H. Lond., Med. Supt., Brook.

BARRETT, H. C., M.B. N.Z., F.R.C.S. Eng., A.M.O. (I), Bethnal Green.

BRATTON, A. B., D.S.O., *M.C.*, M.B. Camb., Histologist (II), Central Histological Laboratory, Archway Hospital.

PILE, C. D., M.D. Dubl., A.M.O. (II), Constance-road Inst.

RAY, H. S., M.B. N.Z., House Physician, St. Olave's.

STOKES, J. E., M.B. Dubl., A.M.O. (I), Colindale.

Certifying Surgeons under the Factory and Workshop Acts: GORDON, B. W. B., L.R.C.P. Lond., M.R.C.S. (Twickenham, Middlesex); GOVERNOR, S., M.B., B.Ch. Belf. (March, [illegible]); GRANTHAM-HILL, C., M.B. Camb., F.R.C.S. [illegible] lk); MACLEAN, A. A., M.B., [illegible] Devon); MACKENZIE, D. B., M.B., [illegible] Aberdeen); RINTOUL, A. H., M.B., [illegible] rth); THORP, K. W., L.R.C.P. Lond., [illegible] Norfolk).

Births, Marriages, and Deaths

BIRTHS

HAUXWELL.—At Liverpool, on 15th instant, to Dr. and Mrs. Hauxwell (Margaret A. Reid, M.B., Ch.B.), St. Helens—a daughter.

MARRIAGES

GOLDEN WEDDING

RICE-OXLEY—AMOS.—On August 23rd, 1883, Alfred James Rice-Oxley, of Coulsbro, Streatham, S.W., son of the late George Oxley and Mary Rice, to Eva, daughter of the late C. E. Amos, C.E.

DEATHS

HARLEY.—On August 17th, suddenly, following an operation, Henry Robert Harley, M.D., of The Ridge, High Road, Harrow Weald, aged 61 years.

KEIR.—On August 18th, William Ingram Keir, F.R.C.S.E., L.R.C.P., of Inveresk, Combe Down, Bath.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

ADDRESSES AND ORIGINAL ARTICLES

EXPERIMENTAL PATHOLOGICAL STUDIES ON THE NATURE AND RÔLE OF BACTERIAL ALLERGY*

By Arnold Rice Rich, M.D.
ASSOCIATE PROFESSOR OF PATHOLOGY, THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, U.S.A.

It is now well known that while the body is acquiring an active immunity to bacteria during infection, the tissues ordinarily become hypersensitive to the protein of the infecting micro-organisms. When this hypersensitiveness has appeared, the tissues will be locally damaged and killed by amounts of the bacterial protein which are harmless to the normal body, and disturbing constitutional symptoms, and even death may occur when amounts of the protein which would be harmless to the normal body find their way into the blood stream of the hypersensitive one. By the side of this hypersusceptibility of the tissues to the protein of the infecting bacteria there is also developed a heightened resistance to the growth of the bacteria, and their spread through the tissues and into the blood stream is markedly inhibited. The state of hypersusceptibility to the bacterial protein is ordinarily spoken of as "allergy"; the ability of the body to inhibit the growth and the invasion of the bacteria, and to neutralise the toxins which they may produce, constitutes acquired immunity.

Definition of Allergy

It is well for anyone who writes or speaks about allergy to begin by defining clearly just what he himself means by that term, for the word "allergy" has come to be applied to the most diverse and unrelated types of altered bodily states. Some writers limit the term "allergy" to hypersensitiveness to foreign protein; others include drug idiosyncrasy; still others speak of acquired immunity to bacteria as "allergy," including even antitoxic immunity; and Pirquet, who created the word, finally extended its meaning to embrace even the bodily changes which occur with advancing age, and which favour the development of malignant tumours.[1] Now it is perfectly obvious that if one starts out by defining "allergy" as a term which shall include not only all hypersensitive reactions but also all immunity reactions, immunity of course at once becomes by definition an allergic phenomenon, and allergy and immunity have to be regarded as identical and inseparable. I feel, however, that such a definition tends to obscure important problems which should be kept before us in sharp relief, rather than be simply defined out of existence. Regardless of what Pirquet's concept of the term allergy may have been, and although there is *no strict uniformity* in the usage of the word at present, nevertheless allergy to-day in the minds of most medical men is synonymous with acquired hypersensitiveness, as any examination of the many papers published every year on the subject will at once disclose; and it is in this sense only that I shall use the term in the present paper. To extend the meaning of the word "allergy" to include every conceivable sort of bodily change simply robs the term of all possible usefulness. In pausing to mention this matter of usage it is my purpose chiefly to stress the point that we must not allow the ambiguities of our definitions to blind us to the fact that there is a very real, a very important, and a very clear-cut problem in the relation of the *hypersensitive* state to the state of *immunity to infection*, and it is this specific and unambiguous problem which I should like to place before you. There is no doubt that a great deal of confusion has resulted from the indiscriminate and unstandardised use of the term "allergy," and this especially, perhaps, where questions of immunity to infection are involved. I therefore wish to state at the outset that by "allergy" I shall mean here only that state of specific hypersensitivity which develops as a result of the entry of foreign protein into the tissues, and which manifests itself locally by the occurrence of tissue damage and inflammation wherever the foreign protein, or even a specific fraction of the sensitising molecule (haptene) lodges in the previously sensitised tissues. When the protein to which the body is sensitised enters the blood stream there ordinarily occur the constitutional symptoms of fever, malaise, and prostration, often of severe degree, and sometimes leading even to death.

Anaphylaxis

Now there is another type of hypersensitiveness which manifests itself through effects which result from the spasmodic contraction of smooth muscle, principally that of the bronchi and of certain blood-vessels. For this type of hypersensitiveness, which is typified by anaphylactic shock, I reserve the term "anaphylaxis." All available evidence indicates that both the necrotising-inflammatory (allergic) type of hypersensitiveness and the musculo-spasmodic (anaphylactic) type are the results of the interaction of the sensitising antigen with an antibody specific in each case for the particular antigen, and it is therefore probable that both states of reactivity are fundamentally the same. However, since their effects are quite different, and since either condition can easily be established without the development of the other, it is convenient in the present state of our information to designate them by different terms.

In the case of anaphylaxis, the antibody ordinarily can be demonstrated in the circulating blood, and a normal animal can be sensitised merely by injecting into it the blood of an anaphylactic one. However, this circulating portion of the antibody is an excess supply and is not at all necessary for the specific contraction of the smooth muscle, for muscle removed from the anaphylactic body and washed free of plasma can still be thrown into violent contraction when brought into contact with the specific antigen in vitro. It is clear, therefore, that in anaphylaxis the effective antibody is that which is bound directly to the muscle cells. Now when the allergic, necrotising-inflammatory type of hypersensitivity is produced experimentally by the injection of a foreign protein into the tissues, as in the case of the Arthus phenomenon, antibody is easily demonstrable in the circulation just as it is in anaphylaxis, and passive transfer of sensitivity can readily be effected. But, curiously, when this allergic type of sensitivity arises as a result of the liberation of bacterial protein into the tissues during infection, it is ordinarily impossible to demonstrate the sensitising antibody in the blood stream, and the sensitivity cannot be transferred passively to a normal animal. We have repeatedly tried to transfer allergy passively in widely different types of bacterial infection, but we have never been able to do so convincingly, and it has been the general experience of others that under properly controlled conditions the necrotising-inflammatory type of hypersensitiveness arising during bacterial infection cannot be transferred to normal animals by injecting into them the serum of hypersensitive ones. Mrs. Lewis and I, however, have been able to show by the method of tissue culture that in bacterial allergy the individual tissue cells of the allergic body are themselves markedly hypersensitive to the bacterial antigen, and remain so even when washed repeatedly to free them from the plasma of the allergic body.[2] It is clear from our photographs that the washed cells of the allergic tuberculous body, when isolated in cultures, are readily killed by amounts of tuberculin which do not damage the isolated cells of the normal body at all. It is therefore clear that in bacterial allergy, just as is the case in anaphylaxis, the effective antibody is that which is bound fast to the tissue cells but, in contrast to anaphylaxis, no appreciable excess of antibody circulates in the blood stream.

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* Opening paper in symposium on Allergy, Third International Pædiatric Congress, London, July 20th, 1933.

Allergy in Tuberculosis

For many years attention has been focused upon the phenomenon of allergy in tuberculosis, but it is becoming continually more apparent to all who give serious thought to the matter that the hypersensitive state plays an important rôle not only in tuberculosis, but in the pathogenesis of bacterial infections in general. It is now thoroughly well established that hypersensitiveness appears in very many, if not actually in all, bacterial infections. In typhoid, streptococcal, staphylococcal, pneumococcal, and numerous other infections we now possess excellent specific antigens similar to tuberculin, which are suitable for clinical use and which readily reveal the presence of hypersensitivity in the human being on intracutaneous injection. In an increasing number of infections it is becoming evident that various lesions and symptoms which were formerly supposed to be the direct results of bacterial poisons are actually the results not of bacterial poisons, but of the hypersensitive state. There is, therefore, at present a considerable ferment regarding the significance of this remarkable condition of hypersensitiveness. Is it indispensable for the protection of the infected body? Or is immunity a completely separate and independent process? Is it a life-saving mechanism in spite of its ugly features, as many believe? Or is it rather an unnecessary and often harmful condition from which we should strive to protect the patient? Such questions as these are being asked on many sides to-day, and they must be answered before we shall be able to adopt a rational attitude toward allergy in the treatment of the many diseases in which it makes its appearance.

Now for years it has been quite generally believed that hypersensitiveness is necessary for the successful operation of immunity; and this chiefly for the reason that one of the results of hypersensitiveness is the development of a rapid and accentuated inflammation at any site at which the bacteria lodge in the sensitised tissues. This inflammation has been shown perfectly clearly to be merely the result of the fact that the bacterial antigen acts upon the allergic tissues as an *irritating, necrotising poison*. Nevertheless, it has been held by most writers that, in spite of the local damage to tissue, this allergic inflammation is necessary for the protection of the body as a whole, for it is assumed that it is the mechanical effect of the inflammatory exudate which is responsible for the localisation of infection in the immune body and, in addition, the exaggerated inflammation is also assumed to be necessary for the more efficient destruction of bacteria which is a characteristic of the immune state.

Separation and Immunity from Allergy

Several years ago, during a study of the pathogenesis of tuberculosis, numerous circumstances were encountered which seemed to us to cast serious doubt upon the widely accepted view that allergy is necessary for the operation of immunity, and that hypersensitiveness can be regarded as a measure of immunity.[3] Now it is quite generally agreed, even by those who regard allergy as a mechanism of immunity, that by far the greater part of the destruction of tissue which occurs in tuberculosis is directly a result of the hypersensitiveness of the tissues to the protein of the tubercle bacillus—a protein which, it must be remembered, has practically no power to damage the non-allergic body. The destruction of tissue occurring as a result of allergic hypersensitiveness is, of course, assumed to be a local sacrifice which the immune body must pay for the beneficial effects which are supposed to attend the exaggerated inflammation that occurs at any site at which hypersensitive tissues are injured by the protein of the bacillus. However, since the view that allergy is necessary for immunity is really only an opinion which rests upon no direct proof of any sort, we came to feel that it was a matter of considerable importance to determine definitely whether or not this allergic damage and death of tissue is actually a necessary accompaniment of the immune state, for it is obvious that if it is not, the perfection of methods directed toward the prevention of this damage by means of desensitisation might be of great service in various bacterial diseases. On the other hand, if allergy is really a necessary part of immunity, as it is so widely believed to be, it would obviously be unwise to attempt to abolish it, for at the same time one would abolish or impair the efficiency of immunity. We therefore turned to a pointed experimental attack upon the question, and in the present paper I shall review for you the results of our studies which were carried out with the object of attempting to separate immunity from allergy, and if the separation could be accomplished, to determine whether or not immunity is any the less efficient in the absence of allergy.

In this investigation we have succeeded in separating immunity from allergy by three different methods and in a variety of different infections. First, we found that it is possible to establish acquired immunity without the concomitant development of allergy. Second, we were able to separate immunity from allergy by injecting the serum of allergic, immune animals into normal ones. The immunity was transferred to the latter, but not the hypersensitiveness. Finally, immunity was separated from allergy by means of desensitisation. In each of these different types of experiment we found that immunity operates in full force in the complete absence of allergic inflammation.

(1) Experiments carried out in collaboration with Dr. Chesney and Dr. Turner [4] demonstrate that immunity can be established without the concomitant development of allergy. These particular experiments deal with syphilis, an infection in which allergy has long been known to occur, and in which immunity has repeatedly been assumed, without investigation, to be the result of the action of allergy.[5] [6] We first inoculated our animals in the testis with spirochætes derived from human chancres. Such inoculation is well known to confer a high degree of immunity to reinfection. However, when we reinfected our immunised animals intracutaneously with large numbers of virulent spirochætes, acquired immunity

nifested itself, not by the assumed occurrence of rgic inflammation at the site, but by a remarkable ifference of the tissues to the presence of the injected rochætes. Examination of the lesions macroscopically l microscopically at different periods after infection ws that the sites of reinfection remained practically mal aside from a slight, evanescent inflammation which s never at any point of time greater than that in the itrols, and no metastatic lesions developed. In contrast the non-immune controls a large local chancre regularly reloped, and lesions in distant tissues were common. is therefore clear that allergic inflammation is not essary for the operation of acquired immunity in hilis. Many similar reinoculations performed on human ings in the primary stage of syphilis have demonstrated t reinoculation in this stage is followed not by an aggerated allergic lesion, but rather by no appreciable ion at all. It is only in the late secondary and tertiary ges that allergy can be demonstrated by the luetin t, and it is significant that it is in this latter allergic ge of the disease that the progressive destruction of sue is most marked.

(2) In the second attack we separated immunity from lergy by passive transfer. I have already discussed e reason why passive transfer of bacterial allergy can rely, if ever, be accomplished. In these experiments, r. Brown and I[7] rendered animals highly allergic and mune to the pneumococcus by vaccination with killed ltures, and we introduced serum from these immune, lergic animals into normal ones. The latter were then fected with virulent pneumococci, and no allergic action whatever was found; yet a potent immunity as present, the animals invariably surviving all of our st doses of pneumococci, which we carried as high as illions of lethal doses.

(3) Finally, we found that when allergy is abolished y desensitisation immunity is left intact. In these experi- ents in which pneumococci and other bacteria have een used, Dr. Jennings and I[15] rendered rabbits allergic nd immune by intracutaneous vaccination with dead rganisms. Desensitisation of half the animals was then ccomplished by the intravenous injection of large amounts f a killed culture. The desensitised animals, the ndesensitised ones, and normal controls were then infected ntracutaneously with virulent organisms, and again rom examination of the lesion it is clear that lthough the desensitised animals showed no allergic eaction whatever, they were as completely immune to nillions of lethal doses as were the allergic ones which leveloped an exaggerated inflammation and suffered a onsiderable local destruction of tissue because of their hypersensitiveness.

It is important to state that these experiments on desensitisation have been extended to tuberculous infection by Dr. Rothschild, Dr. Friedenwald, and Dr. Bernstein in our laboratory. They have been able to show clearly that immunised guinea-pigs can be kept for months in a state of complete desensitisation without suffering any detectable loss of their immunity to virulent bacilli. In these experiments large numbers of animals are first rendered allergic and immune by vaccination with attenuated bacilli. Half of them are then desensitised by gradually increasing doses of tuberculin until they are able to tolerate without symptoms the extraordinarily large daily dose of 2 c.cm. of undiluted old tuberculin. At this point the untreated allergic animals, the desensitised ones, and a similar number of normal controls are infected with identical amounts of a virulent culture, and the desensitised animals continue to receive their large daily dose of tuberculin in order to maintain the state of desensitisation throughout the experiment. We then found the desensitised, completely non-allergic animals were as highly resistant as were the allergic ones, and in addition the former suffered a negligible local destruction of tissue at the sites of infection as compared with the latter. Forty-eight hours after the injection of the same amount of a heavy suspension of virulent bacilli into the skin of the allergic animals, the desensitised ones, and normal controls, there is present in the allergic animals the large, highly inflamed, and sloughing lesion characteristic of the Koch phenomenon—the local sacrifice of tissue which is so widely believed to be necessary for the protection of the body as a whole. However, although lesion in the desensitised animal is only a minute nodule no larger than that in the control, the former is just as immune to infection as is the highly allergic one. Six weeks after infection with the virulent bacilli the organs of the controls are riddled with tuberculous lesions, but those of the allergic and the desensitised animals show at most only a rare isolated tubercle. It is perfectly clear that in the desensitised animals which, it must be emphasised, were kept continually in a state of complete desensitisation by daily injections of tuberculin throughout the period following virulent infection, both the inhibition of spread of the bacilli and the inhibition of their growth in the body was just as effective as in the animals which were allergic at the time of infection and thereafter.

Allergic Inflammation in relation to Bacterial Growth

The experiments which I have shown you make it clear that allergic inflammation is not at all necessary for the more efficient destruction of bacteria in the immune body. In the immune body, in which the capacity for phagocytosis is so greatly increased, the amount of inflammation which occurs as a response to the presence of the bacteria themselves is entirely sufficient to protect against millions of lethal doses of virulent organisms. Indeed, it is especially worthy of comment that in all of our various experiments in which allergy has been excluded, the most striking characteristic of acquired immunity has always been the remarkable indifference of the tissues to the infecting bacteria which are undergoing destruction. This is exactly the state of affairs which obtains in natural immunity. The tissues of the body with a high degree of natural immunity to a particular bacterium are relatively indifferent to the presence of that bacterium as it dies out. There is no appreciable death of tissue, and inflammation is very slight in amount. This is obviously a condition of the body which is far superior to any state of reactivity in which an exaggerated destruction of tissue occurs while the bacteria are being destroyed, such as happens in the allergic body.

What, now, of that other manifestation of immunity —the inhibition of spread of bacteria from the site at which they lodge? This phenomenon is widely believed to be simply a mechanical result of the prompt allergic inflammation which is thrown about the bacteria, and allergy, therefore, has been assumed to be necessary for its existence. However, in all of the experiments which I have shown you, blood cultures and microscopical studies made it perfectly clear that the immobilisation of the bacteria in the immune, non-allergic body was just as effective as it was in the allergic one. Further studies on pneumococcal infection have demonstrated that in the immune body the spread of bacteria is prevented primarily not by allergic inflammation, but rather by the action of antibody upon the bacteria, altering them in such a way that they adhere not only to themseves, but also to the tissues of the immune body.[8] Indeed, Miss McKee and I[9] have shown that even under conditions in which all inflammation is suppressed, at the time when normal controls are dying with huge spreading lesions and with heavy blood-stream infection, the bacteria in the immune animals are still sharply localised at the precise spot where they were injected, in spite of the fact that not a leucocyte and not a particle of fibrin has been thrown out about them, as may be seen in microscopic sections of the lesions which are stained to show the bacteria. Since the same result occurs in passively as well as actively immunised animals, it is clear that the primary agent responsible for the local immobilisation of bacteria is the immune antibody and not allergic inflammation.

The experiments which I have demonstrated to you have been carried out in each instance on large numbers of animals and with careful attention to proper controls. They have shown consistently that neither of the two fundamental protective processes of the immune body (the prevention of spread of bacteria and their efficient destruction) is dependent upon the presence of allergic inflammation for successful operation.

Allergy in the Absence of Immunity

Now since it is clear that allergy is not an essential part of immunity, and that the two phenomena can be separated from each other, it is obviously a matter of interest to know what would be the effect of the presence of allergy in the absence of immunity. This very interesting reverse side of the picture has just been obtained by Sabin, Smithburn, and Geiger of the Rockefeller Institute, and by Seibert of the Henry Phipps Institute for the Study of Tuberculosis, and they have kindly permitted me to quote their conclusions which are in the process of publication. These investigators, working independently, have succeeded in establishing a high degree of allergy to tuberculin by treating animals with large doses of purified tuberculoprotein. Seibert has shown that animals rendered allergic in this manner are hypersensitive to the protein of old tuberculin.[12] When these allergic animals were tested for immunity by the injection of virulent bacilli, it was found that no immunity to infection was present. Indeed, on the contrary, Sabin and her co-workers[10] found that the duration of life was actually shorter in their allergic rabbits than in normal controls, and Seibert likewise found that not only was the time of survival of allergic guinea-pigs shorter, but the extension of infection was hastened and the amount of necrosis and caseation was much greater than in the controls.[11] On the one hand, then, we have the fact that immunity acts efficiently in the complete absence of allergy, and on the other hand that a high degree of allergy can exist in the complete absence of immunity. It is obvious, therefore, that one may not use the tuberculin test and other similar allergic reactions as an index or measure of immunity, as has so often been done in the past. That allergy and immunity may and frequently do coexist there is no doubt; but that they always coexist or that they always parallel each other in degree is certainly not the case. Indeed, when allergy has been dissociated from immunity, as in the above experiments, its only recognisable effect has been to increase susceptibility. The presence of bacterial hypersensitiveness is only an evidence of infection. It means only that bacterial protein has been liberated into the tissues, just as non-bacterial hypersensitiveness means only that the specific protein has found its way into the tissues. Hypersensitiveness to bacterial proteins can be readily established merely by injecting the soluble protein parenterally. But the degree of hypersensitiveness is not a measure of the degree of immunity, nor is it even a measure of the extent of infection. Everyone who has studied tuberculosis clinically from this standpoint must have repeatedly encountered cases in which a low degree of resistance was present with a high degree of hypersensitivity and vice versa. The Negro provides a striking example of the former condition. It has been repeatedly pointed out, and the fact is perfectly clear to all who have the opportunity to study tuberculosis in this race, that whereas the Negro develops a very high degree of hypersensitiveness, as a rule he lacks the ability to develop immunity to the same degree as the white, and he cannot maintain satisfactorily the immunity which he does develop. Thus the "childhood type" of tuberculosis with high allergy and widespread caseation of viscera and lymph nodes is not uncommon in the adult city-dwelling Negro. The most recent confirmation of these now familiar facts relating to allergy and immunity in the Negro is that of Pinner and Kasper[13] in America, and Prof. S. Lyle Cummins arrived at the same conclusion that hypersensitiveness is no index of immunity, from his studies on the lack of correlation between allergy and immunity in the South African Negro in connexion with the work of the British Commission.[14]

Conclusion

It is not my intention to imply that the reactions which are expressed in the form of hypersensitivity to foreign protein can never serve any useful end in any conceivable direction. I am not discussing here the possible teleological significance of the bodily changes which underlie allergy and anaphylaxis. I have sought merely to show you that allergy is not at all necessary for the operation of immunity, and to point out that in the many cases in which hypersensitiveness is recognised by all to be doing great damage to tissues and to be endangering life itself, we may, when we possess an adequate method, protect the body by desensitisation without sacrificing the ability of the body to resist the infection by means of the acquired forces of immunity. The present methods of desensitisation in bacterial hypersensitiveness are far from satisfactory, but it is highly probable that safer and more efficient methods can be developed, and the search for such methods is a matter of major importance, not only for the investigation, but also for the treatment of bacterial diseases. It is only with such methods in our possession that we can determine accurately in the human being whether there are any conditions under which hypersensitiveness may play a beneficial rôle in infections, and under what conditions the abolition of hypersensitiveness in bacterial diseases may be as desirable and helpful as is the accomplishment of desensitisation in food allergy, in asthma, and in hay-fever. In the experimental animal desensitisation has shown that the abolition of hypersensitiveness spares the tissues from an unnecessary and preventable damage. It must remain for controlled clinical experiment to determine whether desensitisation will be similarly beneficial in the human being. I say "controlled" advisedly, for most of the clinical work which has been done on desensitisation in bacterial infection is open to the criticism that hypersensitivity has been only somewhat reduced, but by no means abolished. Furthermore, it is not enough merely to achieve desensitisation; it must be maintained continuously for a period of time long enough to permit the forces of immunity to act without being thwarted by the recurrence of tissue hypersusceptibility. Finally, is obvious that desensitisation may be expected to e beneficial only in those cases in which hyper-ensitiveness is exerting deleterious effects, such s those which are familiar in certain cases of tuberulosis in the human being.

In a very realistic sense it may be said that the resence of allergy converts, in effect, a bacterium hich does not produce a toxin into one which does—e., it converts the harmless protein product of acterial disintegration into a violent and even ethal poison. It must be remembered (and it is, ndeed, a rather remarkable fact) that in spite of the idespread and dogmatic assertions about the rotective rôle of allergy, there is not one single xperiment or observation on record through which ypersensitiveness has been shown to be necessary or the operation of immunity in any infection under any condition whatsoever. The studies presented in this paper serve, on the contrary, to place us in a position which permits us to proceed to investigate pointedly the results of freeing the infected body from the damaging effects of hypersensitiveness, with the knowledge that the abolition of allergy will not entail a loss of the protective power of acquired immunity.

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GENERALISED OSTEITIS FIBROSA

CASE SUCCESSFULLY TREATED BY REMOVAL OF PARATHYROID TUMOURS

BY A. LAWRENCE ABEL, M.S. LOND., F.R.C.S. ENG.

SURGEON TO THE PRINCESS BEATRICE HOSPITAL; ASSISTANT SURGEON TO THE CANCER HOSPITAL AND TO WOOLWICH WAR MEMORIAL HOSPITAL

GEORGE THOMSON, M.B. SYD., M.R.C.P. LOND.

RESIDENT MEDICAL OFFICER, WOOLWICH MEMORIAL HOSPITAL

AND

L. M. HAWKSLEY, M.B. LOND.

PATHOLOGIST TO THE CANCER HOSPITAL (FREE)

GENERALISED osteitis fibrosa is a disease characterised by widespread resorption of bone, and associated with hyperplasia of one or more parathyroid glands, hypercalcæmia, and markedly increased calcium excretion. It advances slowly—usually to a fatal termination—and is accompanied by emaciation, much deformity, and suffering.

Incidents in its discovery.—It was first accurately described by von Recklinghausen,[1] in 1891, and distinguished from osteomalacia. Askanazy[2] next reported a case of generalised osteitis fibrosa associated with a parathyroid tumour, but the significance of the association was missed. It was not until after Erdheim[3] in 1907 had described three cases of osteomalacia with parathyroid tumours that many other cases were observed. Finally, in 1926, Mandl[4] explored the neck in a case of generalised osteitis fibrosa and removed a parathyroid tumour, with disappearance of the bone pains a few days later, marked fall in the urinary calcium excretion, and a check to the progress of the disease. Following these fundamental observations, much interest and research were concentrated on the disease almost throughout the whole world. Accurate biochemical investigations showed a high blood calcium, lowered blood phosphorus, and increase of the plasma phosphatase. The excretion of calcium in the urine was found to be up to even six or seven times greater than normal, the metabolic changes corresponding to those produced by large doses of parathormone. In October, 1931, Donald Hunter[5] found satisfactory proof of the existence of hyperparathyroidism in 28 cases in the literature, and reported four of his own. Recent reports ([6] [7] [8] [9] [10]) include eight cases.

Ætiology.—The very limited statistics show that the disease affects both sexes at almost any age. (Age limits lie between 7 and 59 years, but with most cases between 30 and 55, females preponderating.) Just as the thyroid responds in Graves's disease to some unknown stimulus, so there is a hyperplasia of parathyroid tissue, giving rise to the effects of over-secretion throughout the system. The presence of a hypertrophied parathyroid gland is presumed to give rise to an excessive secretion of parathormone, resulting in a withdrawal of calcium from the bones. In an attempt to maintain the normal blood calcium balance there is an increased elimination in the urine, but the continued hyperparathyroidism maintains the hypercalcæmia at the expense of the osseous reserves.

Morbid anatomy.—At necropsy the bones are found to be soft and deformed, with multiple cysts and brownish-red tumours which may project from the surface. The whole skeleton is affected, and histologically the bones appear to be formed of dense fibrous tissue. They can be cut with a knife. Pathological fractures are not infrequently found. On exploration of the neck one or more reddish- or yellowish-brown lobulated parathyroid tumours may be found, ranging in size from slightly larger than a normal gland up to about the size of a hen's egg.

Pathology.—Turnbull[5] summarises the changes in the skeleton as lacunar resorption, apposition, fibrosis of the marrow, and the formation of osteoclastomata and cysts.

> Resorption is the predominating change which is seen on radiographic and histological examination as a general osteoporosis of variable degree. Active apposition, however, leads to the laying down of new spongy bone. The fibrosis of the marrow is likewise patchy and irregular; it is a sign of great activity attributed to excessive stimulation of apposition by strain and stress upon the weakened bone.
>
> Osteoclastomata are collections of large osteoclasts and undifferentiated fibrocytes. They are thought to be areas of osteogenetic marrow that have been stimulated by over-secretion of parathormone to an exaggerated osteoclastic activity.
>
> Cysts are usually numerous, arising from œdema and degeneration of the fibrous marrow, from dilatation of vascular spaces, or from autolysis in osteoclastomata.

The enlargement of the parathyroids is due to a functional hyperplasia as seen in the constituent cells which contain giant nuclei and multiple nuclei, but never evidence of neoplastic disease.

SYMPTOMS AND DIAGNOSIS

Usually there are bone pains and tenderness, with one or more obvious cysts or tumours. Bowing, deformity, and spontaneous fractures of the long bones may occur. In addition there are often other symptoms, comparable to those observed experimentally after injections of parathyroid hormone (parathormone); muscular hypotonia; gastro-intestinal disturbances (e.g., nausea and vomiting, sometimes with abdominal cramps); impaired renal function with thirst and polyuria, calculi, hæmaturia, and renal colic; abnormal depositions of lime salts in the lungs, stomach, kidneys, and myocardium; amenorrhœa. Marked wasting and emaciation occur in advanced cases.

It is only seldom that a parathyroid tumour is palpable in the neck, and some of the largest have only been revealed at operation. Even at autopsy the tumour may be missed unless very careful search is made. From the point of view of successful operative treatment this cannot be too strongly emphasised, for failure to find the enlarged gland has been responsible not only for failure to cure individual cases but also for much confusion of the true understanding of the disease. It is important to bear in mind that the size of the tumour bears no relation to the severity of the bone lesions.

Radiography reveals generalised rarefaction of the skeleton with numerous cysts. This is best shown by the controlled method whereby the bones of the patient are photographed in turn alongside and on the same film with the corresponding bone of a normal person of the same sex, age, weight, and size.

Blood chemistry.—Estimations of the serum calcium are almost always high (roughly between 12 and 20 mg. per 100 c.cm., as compared with the normal 9 to 11 mg.). Plasma phosphorus is low (1·0 to about 2·0 mg.; normal, 2·5 to 3·5) and plasma phosphatase is sometimes over 1·0 unit per c.cm. (normal=0·15). The excretion of calcium in the urine may be increased on ordinary diet up to six or eight times the normal (normal=0·3 g. in the 24 hours).

A segment of bone, preferably from the tibia, should be removed for histological examination, and will show the typical rarefaction and new bone formation detailed above even in a presumably uninvolved area.

These findings, taken into consideration with the history and physical examination, enable a positive diagnosis to be made.

DIFFERENTIAL DIAGNOSIS

Focal osteitis fibrosa, in which one or more bones may be affected with localised changes exactly similar histologically to those of the generalised disease, must first be considered. It chiefly affects young persons whose health is otherwise normal. The serum calcium and plasma phosphorus are invariably normal, and radiographic examination of the skeleton shows that beyond the affected regions there is no generalised rarefaction of the bones (Hunter,[11] 1930).

In *Paget's osteitis deformans* there is a general osteoporosis with excessive lacunar resorption and apposition. Apposition of new periosteal bone, however, preponderates over the resorption of cancellous bone, instead of the converse in generalised osteitis fibrosa. The blood chemistry is normal and the parathyroids are not involved. The plasma phosphatase is however constantly high (Kay,[12] 1929).

Osteomalacia is an adult form of rickets due to deficient calcification of osteoid tissue from lack of vitamin D. It occurs usually when the diet is grossly inadequate and the worst possible conditions for general hygiene exist. The prevalence of the diseas in women is possibly explained by the influence o pregnancy and lactation, combined with a sedentar and indoor life. The serum calcium is low (5·0 to 7·4 mg per 100 c.cm.) as in low calcium rickets. Plasm phosphorus is also low. Tetany is very commo (Maxwell,[13] 1923).

The condition responds promptly to antirachiti measures—good food, the administration of cod-live oil, ultra-violet light, or irradiated ergosterol. Hyperplasia of the parathyroids occurs in osteomalacia but since all of them are affected it is probabl compensatory (Erdheim [3]).

Hæmatogenous myelomatosis is a rare neoplastic condition of the hæmopoietic marrow, associated with Bence-Jones proteinuria. Multiple myelomata are distributed throughout the red marrow, so that it is localised primarily to the flat bones. Bony destruction may lead to a high blood calcium, but the blood phosphorus is also raised in contradistinction to generalised osteitis fibrosa (Snapper [14]). Parathyroid enlargement may occur.

PROGNOSIS

If left untreated the disease is slowly progressive, with much pain, crippling, and emaciation until death. Removal of the parathyroid tumour as a rule abolishes the bone pains immediately. The serum calcium, plasma phosphorus, and urinary excretion of calcium return to normal. A temporary hypocalcæmia may sometimes occur, associated with latent or manifest tetany. Polydipsia and polyuria disappear, and abnormal metastatic calcium deposits break up. The cysts or tumours diminish in size, and a gradual increase in the density of the bones takes place over a number of years. Symptomatic improvement is more marked than radiographic evidence of bony improvement. The patient's general health improves, weight becomes increased, hypotonia is lost, and the patient, if previously bedridden, gets about once more.

TREATMENT

Pre-operative.—There should be at least a few days' rest prior to operation, and every effort made to build up the general health. A high calcium diet (four pints of milk daily with cream, ice-cream, cheese, and eggs) is necessary owing to the drain on the calcium reserves. Risks of pathological fractures of much weakened bones must be guarded against.

Operative.—Premedication with omnopon and scopolamine, followed by nitrous oxide-oxygen provides the best anæsthesia.

Operation.—A wide exposure is essential. Kocher's collar incision is made so as to give exposure of the neck as far out as the sternomastoid muscles, which are defined and retracted outwards. The pretracheal muscles are divided transversely between clamps, and the flaps so formed are reflected upwards and downwards to give full exposure to both lateral lobes of the thyroid gland. After incising the thyroid fascia each lateral lobe is in turn dissected free and turned medially. A careful search is made in the normal sites for the parathyroid glands. These are variable in position and number, but usually there are a superior and an inferior on each side; rarely three, or even four, glands may be present. They lie in relation to the posterior aspect of the lateral lobe of the thyroid gland.

The superior parathyroid gland lies behind the upper pole of the thyroid gland in relation to the superior thyroid artery. It is situated anterior to the thyroid fascia—i.e., between the latter and the capsule of the thyroid gland.

The inferior parathyroid gland usually lies deep to the inferior pole of the thyroid in relation to the inferior thyroid artery. Here it may be either anterior to the thyroid fascia, similar to the superior parathyroid, in which case it is below the inferior thyroid artery. Any enlargement of a gland in this position tends to be in a downward direction in front of the carotid artery, and may eventually come to lie immediately behind the sternum, in the position commonly occupied by a retrosternal goitre. The inferior parathyroid gland may, however, as pointed out by Walton,[15] lie deep to the thyroid fascia, in which case it is usually above the artery and not visible until the thyroid fascia has been incised. If a gland in this position enlarges it passes downwards behind the œsophagus and then comes to lie in the thorax immediately in front of the upper dorsal vertebræ. A tumour in this position is obviously more difficult to find than one lying in the former. A still further situation may be in the substance of the thyroid gland itself. In these circumstances it is difficult to distinguish the enlarged parathyroid, both from the thyroid gland and from a small thyroid adenoma.

This was one of our difficulties in the case reported below, for the larger of the two parathyroid tumours removed was in the substance of the lower pole of the left lobe of the thyroid gland.

Again, according to Walton, aberrant parathyroids may exist anywhere in the branchial area, and even in the substance of the thymus gland. When operating, therefore, for the removal of a parathyroid tumour, a careful search must first be made in the normal sites. If no tumour is found in these areas the trachea and œsophagus must be defined, and a finger passed down on either side of the trachea into the thorax behind the sternum, and again along the œsophagus, and behind it to search the superior mediastinum in front of the upper thoracic vertebræ. Similarly the thymus gland should be explored, and also a search made in the substance of the thyroid gland itself.

After removal of the tumour the muscles are sutured back in their normal relationship, the cavity drained by a drainage-tube, and the wound closed.

Post-operative.—Special care must be taken to guard against post-operative tetany, for in at least one case it has been known to prove fatal. The serum calcium may drop to 6 mg. per 100 c.cm. before tetany develops. There is a hyperexcitability of the peripheral nerves, with stiffness or tingling of the limbs for some hours or days before the attack. Characteristic spasmodic contractures of the feet and hands (main d'accoucheur), of variable duration, recur at intervals. In extreme cases the muscles of the trunk, neck, and face are involved.

Chvostek's sign (twitchings of facial muscles on tapping facial nerve) and Trousseau's sign (contracture of the hand on applying a tourniquet to the arm) are aids in the diagnosis of latent tetany. Blood examination will give an accurate estimation of the degree of hypocalcæmia.

The latter is combated by a resumption of the pre-operative high calcium diet as soon as possible after the operation, together with calcium lactate by mouth in large doses (grs. 30–60, three times a day). At the first suspicion of tetany, intramuscular calcium gluconate (10 c.cm. of a 10 per cent. solution) or intravenous calcium chloride (10 c.cm. of a 5 per cent. solution) or calcium lævulinate (10 c.cm. of a 10 per cent. solution) for more urgent cases, must be given. Parathormone (30 units, three times daily), by intramuscular injection, may be added if the condition does not respond to the administration of calcium.

The high calcium diet should be continued for many months. Patients unable to afford large quantities of milk and cream may get a large concentration of calcium at less cost and in smaller bulk in the form of condensed or powdered milk. Irradiated ergosterol (e.g., one Radiostol tablet twice daily), with ultraviolet light, will aid in the deposition of calcium in the bones. Where no parathyroid tumour could be found, or where operation was contra-indicated, this latter treatment has been found to be of assistance in increasing the density of the bones. Removal of two normal parathyroids in one case where no tumour could be found at operation led to considerable symptomatic improvement.

CASE REPORT

The patient was a married woman, aged 58, with two children. She had had several attacks of quinsy, and acute appendicitis and *bacillus coli* pyelitis two years ago. Her health was very good until the urgent operation for acute appendicitis was performed. After the operation she never felt that she could walk properly. Her strength did not seem to improve as time went on, and 12 months ago she noticed that instead of becoming stronger she was actually much weaker. She had weakness of all her limbs, but more especially of the right arm. Pain was felt over the middle of the left leg and appeared to be in the bone itself. She always felt tired and faint, so that she walked less and less. The pain in the leg increased, and a swelling appeared over the anterior aspect of the left tibia. This had increased in size up to 2 in. in vertical diameter. More indefinite aching pains were noticed in the other extremities. She was referred to one of us (A. L. A.) by Dr. T. E. Ryves of Blackheath.

EXAMINATION

Thin elderly woman, appearing older than her years; pale and emaciated; able to walk very little and stands with a stoop. Weight: 6 st. 9 lb. 6 oz. Calvaria normal. Sclerotics white. Pupils equal and react to light and accommodation. Hearing normal. Alveolar retraction of gum margins but no gross oral sepsis. The throat showed evidence of old recurrent tonsillar infections. Tongue clean. Mucous membranes pale.

Limbs.—Muscular hypotonia. Slight bowing of both femora. On the anterior aspect of the left tibia at the junction of the upper and middle thirds is a hard tender swelling, 2 in. × 1 in., with edges shelving to tibia. Non-fluctuant, no eggshell crackling; no expansile pulsation. There also appeared to be a slight prominence of the medial tibial condyle on this side.

Neck.—On palpation of the neck the thyroid gland appeared to be small and atrophic. No tumour could be detected.

Chest.—Asthenic type with skeletal parts very prominent. Kyphoscoliosis in the upper dorsal region. Physical signs normal.

Cardiovascular system.—Pulse regular; rate normal: tension raised. B.P. 155/100 mm. Hg. Heart normal in size and contour. Rhythm regular. Soft blowing systolic murmur at the mitral area.

Abdomen protuberant with lax atonic muscles. No abnormality detected beyond appendicectomy scar.

Pelvic and rectal examinations normal.

Urine analysis: Turbid pale amber-coloured urine with a slight deposit. Reaction acid. Specific gravity 1020. Albumin: a trace. Centrifuged deposit contained a few pus cells and some bacilli. Culture: growth of *B. coli communis.* Bence-Jones protein absent. The urine later became quite clear.

SPECIAL INVESTIGATIONS

Radiography by Dr. J. E. A. Lynham showed a cystic area in the left tibia at the junction of the upper and middle thirds. A similar area was seen at the inner part of the upper end, involving both the shaft and the epiphysis. The knee-joints showed calcification on the surfaces of the cartilages.

Before going any further with the case it was decided to follow Donald Hunter's advice and remove a portion of tibia for *microscopical examination.* The most obvious portion was the cystic area, and this was removed under nitrous oxide-oxygen anæsthesia, and showed the changes typical of osteitis fibrosa (see below).

Biochemical investigations.—The blood-serum calcium proved to be 14 mg. per 100 c.cm., and the plasma phosphorus 1·8 mg. (the urinary calcium was not estimated). The Wassermann reaction was negative.

Further radiographic examination.—The diagnosis of parathyroid tumour was quite certain, and Dr. Lynham kindly undertook a complete X ray examination of the patient. The arms and legs were X rayed by the control method—i.e., each bone being photographed in turn on the same film alongside the corresponding bone of a normal person of the same age, weight, size, and sex. Great rarefaction of the whole skeleton was shown. The fifth dorsal vertebra was collapsed; there were profound changes in the other vertebræ, the middle zone of each body being rarefied, and the upper and lower zones apparently condensed. Cyst-like cavities were present in the os magnum, the upper end of the right radius, the middle third of the right ulna (Fig. 1), the right scapula, and to a lesser extent the left scapula. Marked decalcification was noticed in the bones of the pelvis. There was considerable rarefaction of the bones of the skull, and a small cyst in the left side of the mandible.

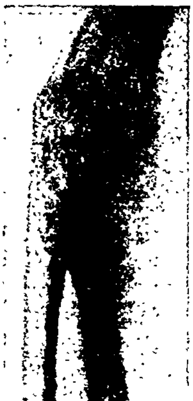

FIG. 1.—Radiogram of right forearm showing generalised decalcification of bones, cyst at upper end of radius, three cysts in ulna, and cyst in os magnum.

HISTOLOGICAL EXAMINATION OF WALL OF CYST OF TIBIA

The cortex is formed of a few scattered trabeculæ of lamellar bone and more numerous trabeculæ of reticular bone, bounded by osteoid tissue. Lacunar resorption by osteoclasts is to be seen in both varieties to a moderate extent; active apposition, however, preponderates. The medullary spaces are occupied by cellular connective tissue which is undergoing fibrosis, and trabeculæ of reticular bone are formed by metaplasia of the fibrous tissue. Apposed osteoblasts are numerous on the outer osteoid zones of such trabeculæ, in many of which calcium deposition has taken place. Throughout the tissue, but more especially in the deeper parts of the spongy cortex are numerous osteoclastomata composed of dense focal aggregations of branching fusiform cells and multinucleated giant-cells resembling osteoclasts. No bone is present in such foci. Interstitial hæmorrhages occur frequently. Cysts, mostly of small to moderate size, are conspicuous features of the loose connective tissue of the medullary spaces; to some extent they appear to result from retraction of fibrous tissue in areas of local œdema, but the majority are dilated capillaries with a well-defined endothelial lining, containing blood cells in process of disintegration, and also strands of a structureless albuminoid coagulum. The largest cysts, visible to the naked eye, generally lack an endothelial lining, and would seem to result both from the confluence of smaller cysts and from the presence of encapsulated collections of fluid derived from hæmatomata.

The histological features of the specimen are those of osteitis fibrosa; but alone are insufficient to determine whether the lesion is a localised one or part of the generalised condition associated with parathyroid tumour; for a conclusive diagnosis the clinical examination and histological data need to be supplemented by a study of radiograms of other parts of the skeleton and by an estimation of the calcium and phosphorus content of the blood.

OPERATION

After ten days' rest in bed and a high calcium diet, the patient was operated upon on August 16th, 1932. Beforehand she was given omnopon, gr. 2/3, and scopolamine, gr. 1/150 (Hoffmann-La Roche). The anæsthetist was Dr. Ronald Jarman, and the anæsthetic nitrous oxide-oxygen.

Kocher's low collar incision. The skin, superficial fascia, and platysma were divided, and the sternomastoid muscles cleared and retracted laterally. The pretracheal muscles were cut through transversely between clamps, and flaps reflected upwards and downwards. This gave good exposure of the thyroid gland, enclosed in its sheath of pretracheal fascia. The thyroid fascia was opened to give a careful definition of each lateral lobe, and the superior and inferior thyroid vessels were located. The middle thyroid vein was secured on each side. Examination of the thyroid gland showed it to be of normal size, though larger than one would have expected from the clinical examination. It had a well-defined lateral lobe on each side and a downward prolongation from the isthmus. In the left lateral lobe at its lower pole was a slight swelling, somewhat darker and more vascular than the thyroid substance and somewhat larger than a walnut. This was kept in mind for investigation at a later stage.

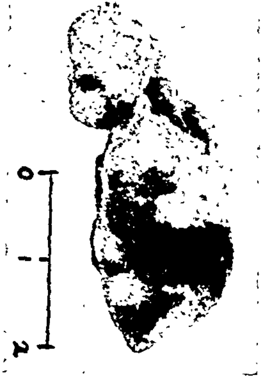

FIG. 2.—Parathyroid tumour removed from lower pole of left lobe of thyroid.

The left side was first explored. By rolling the lateral lobe medially, good exposure of the thyroid bed was obtained. A superior parathyroid gland, about three times normal size, was found and removed. A careful dissection of the œsophagus, trachea, and great vessels failed to reveal any further parathyroid tumour. On the right side a similar dissection and exposure of the structures was made. In the normal site of the superior parathyroid no tumour could be found. The thyroid fascia was dissected away from the trachea and œsophagus, which were cleared so that a finger could be passed from one side to the other. Four small rounded bodies were found behind the lower part of the thyroid bed, and at first were thought to be inferior parathyroids. Two of them were removed for microscopical confirmation but proved only to be lymph glands. A very thorough search was made upwards and downwards along the trachea and œsophagus, but no parathyroid could be located.

The superior mediastinum was explored with the finger and by blunt dissection, both behind the trachea and œsophagus and anterior to them. The thymus gland was located and a portion of tissue near its upper border removed for microscopy.

Disappointment was felt at not having found a more obvious tumour after so thorough a search of the structures of the neck. Attention was redirected to the lower pole of the left lateral lobe of the thyroid, where, as already stated, a suspicious tumour the size of a walnut had previously been noted. This was easily separated from the thyroid tissue and removed. Microscopy showed it to be a parathyroid tumour.

A small piece of tissue from the prominent downward enlargement of the thyroid isthmus was removed at the same time for histological examination. Absolute hæmostasis was secured without difficulty, for the operation had been remarkably bloodless. The thyroid gland was replaced in its bed and the pretracheal muscles sutured. The wound was closed in the usual way, after providing drainage by means of a small glass tube above the suprasternal notch.

PROGRESS AFTER OPERATION

Seventy-two hours after operation the serum calcium had fallen to 12·5 mg. per 100 c.cm. On the sixth day wo attacks of paroxysmal tachycardia occurred with reat distress and restlessness. Digitalis was administered with hypodermic injections of morphine. An ntravenous injection of tetanol, 5 c.cm., was given in case ny gross disturbance of the serum calcium level might ave been responsible. The pulse remained rapid for ome days but gradually became normal. A fortnight fter operation the serum calcium was still 12·5 mg. Convalescence from then on was quite uneventful. A igh calcium diet was administered as soon as possible fter operation, with radiostol and ultra-violet light. The patient was discharged from hospital Sept. 6th, 1932. Ten weeks after operation she had improved greatly. The bone pains had disappeared. Her colour and general ondition were much better. She was steadily gaining weight and already able to walk a little. On Nov. 3rd, 932, the serum calcium was 10·7 mg. per 100 c.cm. When seen on July 7th, 1933, improvement had been teadily maintained.

REPORT ON TISSUES REMOVED AT OPERATION

1. *Left inferior parathyroid gland* (Fig. 2).—An irregularly oval, slightly lobulated mass, with a delicate capsule over all but its inner aspect; of deep red colour, with a paler nodular projection at the upper pole; maximum diameters 4·0 × 1·8 × 1·6 cm.; weight 4·32 g. Microscopically sections of tissue taken from two different parts of the main mass have the same general features (Fig. 3). By the ramifications of fibrous tissue septa the gland is divided into acini, of varying size and shape, which are occupied by polygonal pale oxyphil cells with finely granular cytoplasm and well-defined cell membrane. For the most part the cells are dropsical with widely separated granules, in some cases little but cell wall and nucleus remaining. The deeply staining nuclei are everywhere conspicuous: generally spherical, with a compact chromatin network and from one to four nucleoli, their shape and size, which ranges from 6 μ upwards, show considerable variation; most of the acini contain one or more cells with giant or multiple nuclei. In a few of the acini isolated dark oxyphil cells are to be found; in still fewer there is a central oxyphil coagulum. Vascular congestion has resulted in dilatation of many of the sinusoids, some of which have ruptured into the glandular acini. The interacinar fibrous tissue septa show some hyaline change and a considerable deposit of granular blood pigment.

Sections of tissue from the upper pole of the tumour show a different histological picture, which resembles that of the second enlarged parathyroid gland removed.

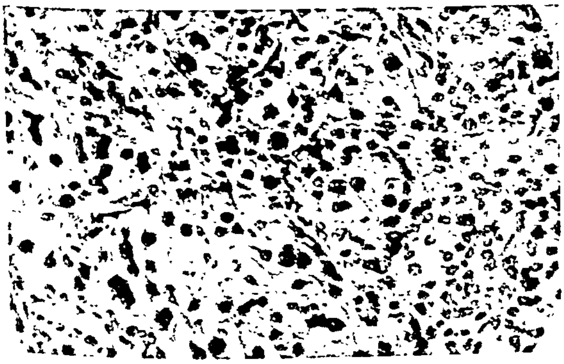

FIG. 3.—Photomicrograph of left inferior parathyroid tumour. (× 270.)

2. *Left superior parathyroid gland.*—A dark red reniform gland, 1·6 × 0·8 × 0·8 cm. in its largest diameters. Both in this gland and in the upper part of the larger (inferior) one, groups, strands, and small acini of pale oxyphil cells are scattered diffusely throughout an œdematous hyaline connective tissue stroma (Fig. 4). Relatively few dropsical cells are to be seen. The outlines of individual cell walls are almost indistinguishable, only variations in the degree of granularity or depth of staining of the cytoplasm serving to indicate the limits of adjacent cells; where no such difference exists the appearance of syncytial masses is produced. Giant nuclei occur, but are far less numerous than in the larger gland. On the other hand, colloid-like intra-acinar coagula are not infrequent. Capillary engorgement is absent, but blood-cells lie free in many of the acini. Immediately beneath the capsule are a few isolated small acini of principal cells having the appearance of normal parathyroid tissue. Some well-formed acini of slightly vesiculated basophilic and neutrophilic cells form a transitional zone between these and the oxyphilic cells constituting the chief histological feature in the structure of the gland.

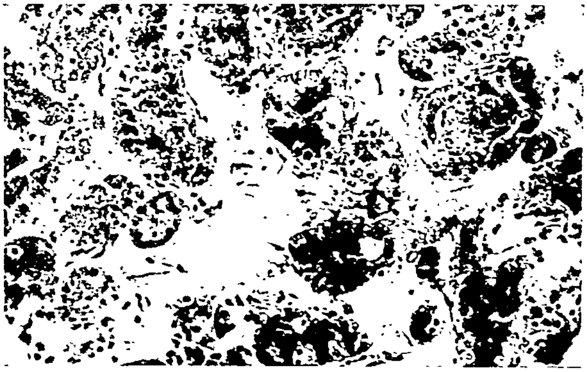

FIG. 4.—Photomicrograph of left superior parathyroid tumour. (× 140.)

In neither of the specimens is there any indication of a neoplastic process: the condition appears to be simple overgrowth of normal parathyroid glandular tissue, with retrogressive change in the characters of the principal cells. Metastatic deposits of calcium in the walls of blood-vessels or in the fibrous tissue stroma have not been detected in any of the sections.

3. *Tissue from thymic region.*—No thymic tissue is seen. A parathyroid gland of normal size and structure is present in loose connective tissue which contains also two small lymphatic glands.

4. *Thyroid tissue.*—Interlobular and interfollicular connective tissue is increased; the follicles, which vary greatly in both size and shape, have a lining epithelium mainly of cuboidal type, but follicles with infolded walls covered by columnar epithelium occur occasionally. Very numerous and large lymphocytic deposits are a prominent feature.

We wish to record our thanks to Dr. Donald Hunter for his helpful suggestions with regard to this case and report, and to Dr. J. E. A. Lynham for the trouble he took with the many radiological examinations.

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ADENOMA OF THE PARATHYROID ASSOCIATED WITH GENERALISED OSTEITIS FIBROSA

By S. C. Dyke, D.M. Oxf., M.R.C.P. Lond.
PATHOLOGIST TO THE ROYAL HOSPITAL, WOLVERHAMPTON

R. Milnes Walker, M.S. Lond.
SURGEON TO THE HOSPITAL

AND

E. Freeman, F.R.C.S. Eng.
SURGEON IN CHARGE OF THE ORTHOPÆDIC DEPARTMENT

THAT oversecretion of the parathyroid hormone causes decalcification of the bones, with consequent hypercalcæmia and excessive excretion of calcium in the urine, is now well recognised. Light has been thrown on the process by the study of cases of adenoma of the parathyroid in which excessive secretion over a long period has produced the condition of the bones which was originally described by von Recklinghausen,[1] and is usually called generalised osteitis fibrosa.

The association of osteitis fibrosa with tumours of the parathyroid was first recorded by Askanazy [2] in 1904, but it was not until 1926 that Mandl [3] first explored for and removed a parathyroid adenoma in such a case. Since that time the operation of parathyroid adenomectomy for this form of osteitis has been performed many times, and in the majority of instances has resulted in the disappearance of the symptoms referable to the skeletal disease. Attention in this country has lately been directed to the syndrome by the work of Donald Hunter,[4] who has summarised the literature up to 1931, and has recorded 23 cases, including 4 of his own. Last year Lièvre [5] exhaustively considered the whole subject, and recorded 4 further cases, 3 of his own and 1 of Gold.[6] Other cases have been recorded by Weil and others,[7] Wickmann,[8] Ask-Upmark,[9] Cohen and Kelly,[10] Elmslie, Fraser, and others,[11] Cosin,[12] Chievitz and Olsen,[13] and Gordon-Taylor and Willes.[14] It was owing to having seen specimens from this last case, and having heard the discussion thereon at the meeting of the Pathological Society of Great Britain and Ireland held at the Middlesex Hospital in January, 1930, that one of us (S. C. D.) was able to identify the condition in the case described below.

As a class these cases are peculiarly intriguing in that the diagnosis of a parathyroid adenoma can seldom be made at the bedside; as in the present case, they usually fail to betray themselves to palpation or inspection, and the diagnosis must depend upon chemical combined with radiographic examinations. Enough evidence has now accumulated to show that hypercalcæmia with excess excretion of calcium in the urine and signs of skeletal decalcification with formation of cystic spaces in the bones points clearly to the presence of a parathyroid adenoma, and that on careful search the surgeon will seldom be disappointed.

FIRST CASE RECORD

The first case first came to the notice of one of us (S. C. D.) in July, 1930, when the patient was in the Royal Hospital, Wolverhampton, under the care of the late Mr. Anthony Blackstock, at that time orthopædic surgeon to the hospital. The patient was a girl, 14 years of age, and had been admitted with a diagnosis of "rheumatism." She was well grown and healthy looking, the only deformity being an inch of shortening in the right leg. She stated that her trouble had begun about six months previously with pain in the right great toe, which had later extended to the whole of both legs so that walking had become painful and difficult. While lying in bed pain was absent. Radiograms showed rarefaction of the bones and deformity of the right hip (Fig. 1), and led to an examination of the blood calcium and of the urinary calcium excretion. The serum calcium was found to be 16·7 mg. per 100 c.cm.; the urinary calcium was 64 mg. and the total calcium excretion in the urine on an ordinary diet in 24 hours was 966 mg.

These abnormally high figures, combined with the bony rarefaction and softening, pointed to a disturbance of calcium metabolism, and it was then suggested that the neck should be explored for a parathyroid tumour. The suggestion, however, was not then adopted; the legs were put into plaster for some months and in September, 1930, the patient left hospital on walking callipers. At that time the serum calcium showed the high figure of 17·75 mg. per 100 c.cm.

Attention was next drawn to the case in December, 1931, when one of us (S. C. D.) was shown radiograms of a case of "osteomalacia" by Dr. G. Dyas, radiologist to the hospital. Inquiry elicited the fact that the case was the same that had been seen in the wards in 1930 and that the patient was now attending E. F.'s out-patient department. She was admitted for investigation.

The patient was now bedridden; the curvature of the thoracic spine had brought the chin almost to the chest; the chest was greatly deformed, showing an exaggerated "pigeon-breast" and a marked Harrison's sulcus; the ribs were amazingly soft and elastic and could be dented inwards by very slight pressure of the fingers; both arms showed bowing of the ulna and dinner-fork deformity of the wrists; the right leg showed an inch of shortening with limitation of flexion, abduction rotation, and internal rotation; radiograms showed right coxa vara and considerable deformity of the pelvis (Fig. 1). The general health was good; there was no complaint of pain so long as the patient was at rest; the skin was soft and smooth, the complexion ruddy, hair glossy, and teeth exceptionally good.* The patient's appetite was good, and her mental state placid and contented; the menses were regular and normal in amount.

An attempt at this stage to get the patient on to a trolley for the purpose of transfer to the radiographic department for examination of the bones resulted in the fracture of both femora.

The patient was put for three days on an ordinary mixed diet, followed by three days on a low calcium diet drawn up by Dr. Donald Hunter and kindly supplied by Mr. F. S. Clayton, F.R.C.S., of the Manor Hospital, Walsall. This diet contained 102 mg. of calcium daily. The whole of the fæces and urine were collected throughout the period of observation and the daily excretion of calcium estimated. Before commencement of the test-feeding period, at the change from ordinary to low calcium diet, and at the conclusion of the period of observation, the patient received cachets of carmine, the appear-

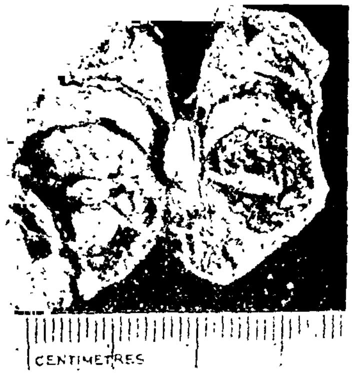

FIG. 2.—Encapsulated tumour with several large areas of hæmorrhage giving a laminated appearance.

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* The fact that the teeth do not share in the general decalcification in this condition has attracted the attention of various writers; Rushton,[15] commenting on Cosin's case, draws important inferences from the dental standpoint from this feature.

ance of the dye in the fæces serving as an indication for the demarcation of the various periods of observation.

Calcium Balance: Observation 1

Three-day periods.
Daily average Ca excretion (urine and fæces).
Ordinary diet 252 mg. Ca.
Low Ca diet (102 mg. Ca) 157 mg. Ca.
Negative Ca. Balance 55 mg. daily.

Serum Ca		
	on ordinary diet	14·0 mg. per 100 c.cm.
	on low Ca diet	13·0 ,, ,, ,, ,,

OPERATION

On March 2nd, 1932, R. M. W. explored the neck. Intratracheal ether anæsthesia was given. A wide collar incision was made at the level of the isthmus of the thyroid gland. The sternohyoid and sternothyroid muscles were divided transversely on both sides, giving a full exposure of the thyroid gland. As the right side of the neck appeared to be slightly fuller than the left, the right lateral lobe of the thyroid on the right was dislocated forwards. There was no evidence of a tumour in the region of the parathyroid glands on this side, so the lobe of the thyroid was replaced and the procedure repeated on the left side; to accomplish this it was necessary to divide an abnormally large middle thyroid vein. Immediately behind the posterior border of the lateral lobe of the thyroid was an oval maroon-coloured tumour lying in the position of the inferior parathyroid body and measuring about 3 by 2 by 1 cm. Its long axis was vertical and its lower pole on a level with the inferior thyroid artery, from which it received a pedicle of vessels. The tumour was very soft, a fact which undoubtedly accounts in great measure for the difficulty in palpating such tumours before operation. It lay in the site which Walton[14] describes as position 2, but was in front of the thyroid fascia. It was easily enucleated and removed after ligature of the vessels running to it from the inferior thyroid artery. The muscles were approximated with fine silk sutures and the skin united by a subcuticular stitch; a small drain was inserted for 24 hours.

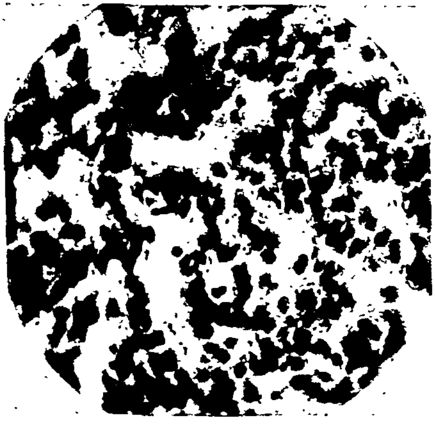
FIG. 3.—Peripheral part of tumour showing widely dilated blood spaces lined with a single layer of endothelial cells. (×250.)

The patient stood the operation well; it was anticipated that symptoms of hypocalcæmia might arise after the removal of the tumour, and through the kindness of Messrs. Allen and Hanburys and Philip Harris and Co., a large stock of Parathormone was made available; actually the necessity for its use never arose.

EFFECTS OF OPERATION

Three days after the operation the serum calcium was 14·8 mg. per 100 c.cm.; five days later it had fallen to 10·5 mg. Owing to the helpless state of the patient it was at this time impossible to subject her to calcium balance investigations. On the ordinary hospital diet at this time the daily calcium excretion averaged over a three-day period only 786 mg. per 100 c.cm. By the end of April the patient had completely recovered from the operation; she was free from pain and was able to get about the ward on crutches. Radiograms taken at this time disclosed hitherto unsuspected fractures of both humeri; union was firm and position reasonable.

Calcium Balance: Observation 2 (after operation)

Total Ca excretion (urine and fæces).

Ordinary diet:—		Low Ca diet (102 mg. Ca):—	
First day.. ..	389·2 mg.	First day.. ..	106·4 mg.
Second day ..	44·8 ,,	Second day ..	61·6 ,,
Third day ..	271·6 ,,	Third day ..	109·2 ,,
Daily average ..	235 ,,	Daily average ..	92 ,,
		Positive Ca balance	10 mg. daily.

The serum calcium at the end of the observation was 11·5 mg. per 100 c.cm.

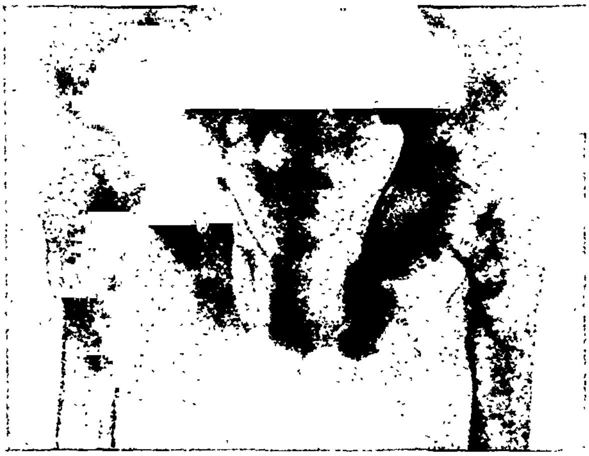
FIG. 1.—Radiogram (Case 1) showing rarefaction of bones, right coxa vara, and considerable deformity of pelvis.

Shortly afterwards the patient left hospital free from pain and walking on callipers with the aid of crutches. Since that time the callipers and crutches have been discarded and the patient is able to walk with only slight assistance from a stick; pain has completely disappeared and, save for the deformity established before the operation, the patient is normal.

PATHOLOGY OF TUMOUR (S. C. D.)

The tumour (Fig. 2) measures 3 by 2 by 1 cm. and is deep red in colour; it is enclosed in a distinct but thick capsule. On section it shows several large areas of hæmorrhage; the non-hæmorrhagic portions are a yellowish-grey. The hæmorrhage has occurred in such a way as to give a laminated appearance to the cut surface.

Histologically the tumour consists of closely packed spheroidal cells. Two types of cell are distinguishable; the two types tend to occur in aggregations but transitional forms are to be found and the two types no doubt represent forms of one cell, that being the "principal" cell of the normal gland. In the commoner type the cytoplasm is scanty and stains poorly with eosin; the cell boundaries cannot be distinguished; the nuclei of this type are large and reticulated. The second cell type shows a more bulky cytoplasm staining rather better with eosin and the cell boundary is well marked; the nucleus of this type is smaller than that of the first type and stains more deeply. These cells, however, do not resemble the "eosinophil" cell of the normal parathyroid.

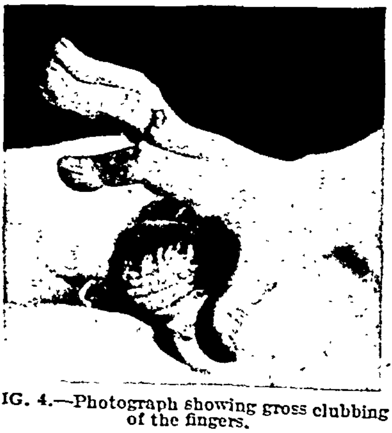
FIG. 4.—Photograph showing gross clubbing of the fingers.

The arrangement of the cells is in columns and rosettes; very occasionally the formation of an acinus has taken place in the centre of a rosette; such acini contain scanty colloid material staining pink with eosin. The cells are held in place by a very tenuous stroma. The periphery of the tumour shows a plentiful supply of widely dilated blood sinuses lined by a single layer of endothelial cells (Fig. 3); as the deeper portions of the tumour are approached the sinuses and capillaries, though still present, are less obvious.

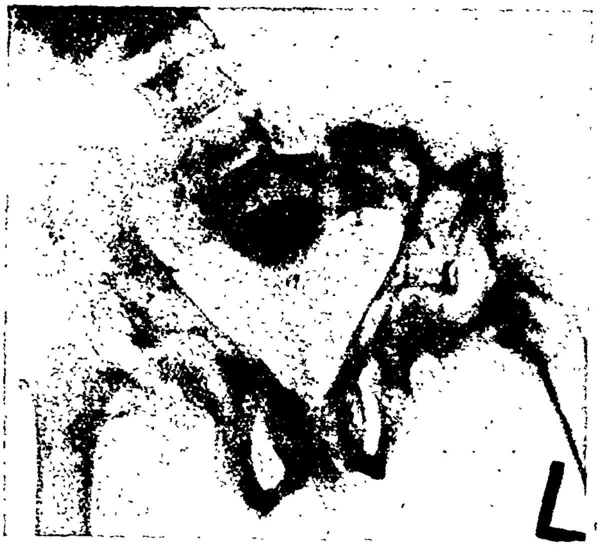

FIG. 5 —Radiogram of the pelvis in the second case.

A SECOND CASE

The following case came under our care later.

The patient, a girl aged 14, was first seen by one of us (E. F.) in May, 1932. She gave a history of progressive painless deformity of all bones extending over past four years. Deformity commenced in left leg and thereafter extended to right leg. The patient had previously attended the orthopædic department of the Royal Hospital, and bilateral osteotomy had been performed by the late Mr. Anthony Blackstock in 1930. The operation was followed by no improvement and the patient had since only been able to get about on crutches. In June, 1932, admitted to the Royal Hospital with a fracture of the left clavicle and of both bones of the left forearm. A determination of the serum calcium made in the pathological department of the hospital at this time showed 13·6 mg. Ca per 100 c.cm. In June, 1933, patient sustained a fracture of the left ulna for which she was again admitted to hospital under E. F., by whom she was transferred to S. C. D. for investigation.

She was a dwarfed and deformed girl; bright and highly intelligent; teeth good; marked genu valgum of both legs; marked curvature of the spine; high degree of clubbing of the fingers (Fig. 4); no lenticular opacities. Blood pressure 160/100. Radiography showed a high degree of rarefaction of all bones (Fig. 5). Serum calcium 17·7 mg., and inorganic phosphorus 2·8 mg. per 100 c.cm.; blood phosphatase (new method of Kay and Jenner[17]) 42 units.

Calcium Balance

Calcium excretion in urine and fæces—
Three days normal diet.
Average daily excretion 1070 mg.
Three days low Ca diet (102 mg. daily).
Average daily excretion 335 mg.
Negative calcium balance 233 mg.
Serum Ca while on normal diet .. 12·75 mg. per 100 c.cm.
Serum Ca while on low Ca diet .. 13·80 " " " "

Operation.—On July 11th R. M. W. explored the neck and found and removed a dark-coloured tumour about the size of a walnut lying behind the lower pole of the right thyroid lobe and partly underneath the sternum. The tumour was well encapsuled; weight 5 g. On section it presented a maroon-coloured surface without the laminations shown by the tumour from Case 1. Microscopically, with the exception that hæmorrhages were absent, the appearances were identical with those found in the first tumour.

The patient stood the operation well. On the day following the operation she was well enough to take ordinary food and her progress to the time of writing (August) has been satisfactory. No symptoms of tetany developed after the operation. The patient is now in a convalescent home awaiting treatment by the orthopædic department for the correction of the established bony deformities.

The clubbing of the fingers in this case is of the same type as that recently described by Keynes and Taylor,[18] but more pronounced.

Our thanks are due to Dr. Eileen Harvey, assistant pathologist and medical registrar to the hospital, for assistance in the supervision of the cases; to Sister Phyllis Armitage for her unremitting care and skill in the regulation of the diet and the collection of specimens; and to Mr. R. L. Dutton, senior technician in the pathological department of the hospital, for the performance of many laborious estimations.

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A CLINICAL COMPARISON OF BETA AND GAMMA RAY THERAPY FOR RODENT ULCER

By W. J. O'Donovan, O.B.E., M.D., M.R.C.P. Lond., M.P.

PHYSICIAN TO THE SKIN DEPARTMENT OF THE LONDON HOSPITAL

AND

R. T. Brain, M.D., M.R.C.P. Lond.

ASSISTANT PHYSICIAN TO ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN; HON. CLINICAL ASSISTANT, SKIN DEPARTMENT OF THE LONDON HOSPITAL

Recent developments in radium technique have been exclusively concerned with gamma rays, and the efficacy of beta ray therapy has been questioned. Treatment with unscreened radium plates is still in common use, and dermatologists in general are agreed that it is valuable for superficial skin lesions. Ward[1] supported in 1930 this view with a report of a large number of cases treated at the Radium Institute, London. Finzi,[2] on the other hand, says that "*the most important thing about the radium treatment of rodent ulcers is not to use unfiltered or lightly screened radium radiations.*" (The italics are his.)

Unfortunately few figures have been available for comparison of the two methods, for until the introduction of the screened radon seed, gamma ray therapy was limited to in-patients, owing to the length of time required for using screened radium plates. Now, however, a comparison can be attempted, and for this purpose dermatologists are fortunately placed, because malignant disease is presented to them in its earliest, simplest, and most accessible forms.

In this paper the discussion is limited to the commonest type of malignant skin disease, the rodent ulcer. More than 100 cases of this disease are seen each year in the skin department of the London Hospital, and the clinical features are usually so characteristic that clinical diagnosis has almost achieved certainty. Occasionally some doubt is provoked by an unusual appearance or by the rapid growth of a lesion, and then biopsy may reveal that it is a mixed squamous- and basal-celled epithelioma, or a true squamous- and horny-celled one. We submit that this point is of little therapeutic importance, for in our experience the small squamous-celled lesions of the skin respond equally well to radium therapy. Two cases in our series were shown by biopsy to be of mixed-celled type, and these are included, although the frankly squamous-celled lesions, either clinically or histologically, are excluded.

Before proceeding to the clinical discussion it is important to realise that there are essential differences between the beta and the gamma rays. Beta rays are misnamed, being particulate, and consisting of electrons shot from an orbit of an atomic system with velocities varying up to 180,000 miles per second. The cathode rays of the X ray tube are of a similar nature, but the identical particles have a much smaller velocity and cannot penetrate the glass walls of the tube. Therefore the beta rays from radium are unique as a therapeutic agent, whilst the gamma rays are waves of the ether which correspond to X rays but have a smaller wavelength. Although it might appear from these facts that very different therapeutic effects would be obtained from these two distinct types of radiation, there is a close association and inseparability of the rays which make it impossible to get a pure irradiation effect of either kind. For instance, when one uses a technically unscreened radium applicator as a source of beta rays, the gamma rays are unavoidably present too; and, in addition, secondary gamma rays are produced in the tissues by the impact of a beta particle upon an atomic system. Owing to the very much shorter exposure to beta irradiation, and the much greater absorption of the beta rays by the tissues, the possible effects of the primary and secondary gamma rays are usually disregarded. By means of suitable screens it is a simple matter to employ gamma rays alone. Here again secondary beta rays are inevitably produced in the screen and in the tissues also, but the energy values of these secondary rays are so much less than those of the primary beta rays that they too may probably be ignored. In actual fact the true mechanism of cell or tissue reaction to irradiation of any kind is quite obscure.

METHODS OF TREATMENT USED

In our series of cases beta irradiation was given by means of relatively unscreened radium plates, and gamma irradiation by the use of screened radon seeds according to the following techniques:

1. *Beta Irradiation.*—Following Dr. J. H. Sequeira, the routine treatment consisted of three applications of a full strength, unscreened, rubber-protected radium plate in skin contact for three periods of two hours each at intervals of six weeks. Elsewhere it is more usual to give a single dose of the same order, and to repeat it only when necessary.

2. *Gamma Irradiation.*—According to our technique, described[3] in 1931, platinum radon seeds, length 1 cm., walls 0·3 mm., were implanted in the lesions and left in position for five to seven days. Occasional variations in the radon content of the seeds, 1 to 2 millicuries, needed longer or shorter periods of application. Dosage was experimental and varied from 50 to 230 millicurie hours per square centimetre, although as a rule the figure lay between 100 and 120 millicurie hours. Area is quoted instead of volume, because in dermatological practice such lesions are essentially superficial, so that if adequate irradiation is given as uniformly as possible to each unit of surface it may safely be assumed that the depths of a lesion will be treated adequately too.

The groups of cases treated by these two methods are believed to be fairly comparable, since no attempt at selection was made—except that lesions on the eyelids or occupying awkward angles of the face were treated more conveniently with radon. The cases treated with radium plates were referred independently for the routine treatment by other workers in the skin department.

REACTIONS AND RESULTS

The reactions to these two modes of treatment vary considerably in different patients, and with the doses mentioned no characteristic reaction to beta or gamma irradiation can be recognised. The immediate reaction to the former is usually seen as a mild dermatitis beginning on the sixth to the tenth day. Some irritation is common; the reaction is maximal in the third week, and usually ends with the formation of a crust or scab, which separates, leaving a smooth pale surface in the fifth or sixth week. With the passage of time the scar often becomes almost imperceptible; more rarely there appear to be atrophic changes which leave a more obvious scar with occasional fine telangiectases. Irritation may persist in the scar for a long time. With implanted radon seeds an erythematous reaction is often present when the seeds are removed, or as pointed out by Roxburgh,[4] the erythema may not appear until a week later. Irritation is rarely complained of, and the superficial ulceration which is unavoidable if the skin surface was previously broken is painless. The reaction is maximal in the third or fourth week, and the skin surface is restored by the sixth week, although a thin scale may persist for perhaps a further month. Later the scar tends to become inconspicuous or remains to mark the site of the seed with a pale linear relic. It is probable that even better cosmetic results are obtained by applying screened radon or radium to the skin instead of implanting it, and Finzi makes this point in his paper. We have often used the method with radon for the superficial cicatrising type of rodent ulcer, but we have not included the results of this technique in this discussion.

Our clinical material consists of 116 cases of previously untreated rodent ulcers which have remained under observation for a minimum period of two years since their first treatment. In this paper the term "cured" implies freedom from relapse within that period, and the term "apparently cured" is applied to those cases which, after a second treatment, were not observed so long. The accompanying Table summarises the results of treatment by the two methods.

It may be said of both groups that no relationship could be discovered between the age of a patient or the duration of a lesion, and the probability of a cure or relapse. The latter usually becomes manifest as a persistent ulcer, a small translucent nodule, or as an area of induration at the edge of the scar. When the cosmetic result is good it is sometimes difficult, if not impossible, to determine whether or not a relapse has actually occurred upon the site of the original lesion.

—	*Group 1.*—Beta Irradiation.	*Group 2.*—Gamma Irradiation.
	Cases and percentage.	
Total	66	50
First treatment Cured ..	54 (82 %)	45 (90 %)
First treatment Relapsed ..	12 (18 %)	5 (10 %)
Second treatment Cured ..	63 (95 %)	46 (92 %)
Second treatment Relapsed ..	3 (5 %)	4 (8 %)

Group 1 comprises 66 cases which were treated with an unscreened radium plate by the method described; 54 were cured and 12 relapsed after the first treatment. Brief clinical details of the relapsing cases are given below.

1. Female, aged 80, lesion above right eye, duration uncertain. Relapsed eight months after first treatment and 15 months after second treatment. Apparently cured by third treatment with the radium plate.
2. Female, aged 53, lesion below left eye for six years. Relapsed ten months after treatment. Cured by second treatment.
3. Female, aged 74, lesion on right side of nose four months. Relapsed six months after treatment. Cured by second treatment.
4. Female, aged 37, large lesion on left cheek for ten years. Small relapse seven months after treatment. Cured by second treatment.
5. Male, aged 73, lesion below right ear for eight years. Small relapse after eight months. Cured by second treatment.
6. Male, aged 48, lesion at left inner canthus for six years. Relapsed four months after first treatment and two years after second.
7. Female, aged 47, lesion on left side of nose for one year. Relapsed four months after treatment. Cured by second treatment.
8. Male, aged 50, lesion in front of right ear for seven months. Relapsed one year after treatment. Apparently cured by radon.
9. Female, aged 54, lesion on left side of nose for three years. Relapsed five months after treatment. Cured by second treatment.
10. Male, aged 64, lesion on left temple for ten years. Relapsed seven months after treatment. Cured by second treatment.
11. Female, aged 58, lesion below chin for two years. Relapsed five months later. Cured by second treatment.
12. Male, aged 69, lesion on nose for three years. Relapsed nine months later. Cured by second treatment.

Although the number of relapses after one primary treatment is considerable, it will be noted that the response to a second course of treatment with the radium plate is very satisfactory. Thus out of the 12 relapses, 9 were cured and 2 were apparently cured by a subsequent treatment. The refractory case, No. 6, was a man with a rodent ulcer involving the inner canthus, and for obvious mechanical reasons of access this case should have been treated with radon. Here then is a group of small superficial radiosensitive lesions treated by a method so simple and with a source of radio-activity so constant that it would seem impossible to vary appreciably the quantity or quality of radiations reaching the subjacent tissues. Yet for some reason quite obscure about one case in every five relapses. It seems obvious that even with particularly radiosensitive lesions marked variations occur in the individual susceptibility to irradiation, and a certain number of failures are inevitable with any technique.

Group 2 consists of 50 cases which were treated with implanted platinum radon seeds; 45 were cured and 5 relapsed. Brief details of the latter are given below.

1. Female, aged 64, lesion below right eye for five years. One radon seed, 1·5 mc. content, inserted for two days (60 mc. hrs.). Reaction slight. Small recurrence ten weeks later. Second seed implanted for 95 mc. hrs. Cured.
2. Male, aged 76, lesion below left eye for four years. One radon seed, 1·5 mc., inserted and not recovered for four months, 200 mc. hrs. Skin healed after five weeks. Small recurrence a year later. Apparently cured by a second seed, 60 mc. hrs.
3. Male, aged 66, lesion in front of left ear, duration uncertain. Four radon seeds inserted around lesion, 2 by 1·6 mc. and 2 by 1·3 mc. Two seeds recovered after three days, one after ten days, and one not found—i.e., 74 to 148 mc. hrs. Sound scar after delayed healing. Recurrence below scar after 14 months. Apparently cured by insertion of four more seeds, 130 mc. hrs. each.
4. Male, aged 64, lesion across bridge of nose for 40 years. Four radon seeds inserted, 1·5 mc. each, 140 mc. hrs. Sound scar after healing. Relapsed after 22 months.
5. Male, aged 66, lesion on left side of nose for 18 months. Two radon seeds inserted, 2·1 mc. for three days, 115 mc. hrs. each. Relapsed after 16 months.

Why these cases relapsed is not clear. On comparison with the cured cases nothing significant is revealed even in the matter of dosage, for one case resisted 200 mc. hrs. of irradiation, whilst among the cured were cases after 51 and 60 mc. hrs., and six others which received approximately 100 mc. hrs. These facts give some idea of the extraordinary variation in radiosensitivity occurring in a group of similar lesions, and it is apt to be forgotten that the response to irradiation which determines the issue is not solely the response of the lesion but the response of the individual also. The five relapsing cases have responded to a subsequent treatment with radon or radium; one is cured, two apparently cured, and two are still reacting.

CONCLUSIONS

It may be concluded from this brief comparative study of the two methods of treatment that there is no outstanding advantage in the use of either one of them. Still the response to the primary treatment was decidedly better after gamma irradiation, and this is generally regarded as one of the essential criteria of any radiotherapeutic method of treating malignant disease. In this series of rodent ulcers our figures for the results of subsequent treatment do not support the view that it is an essential criterion, but it is admitted that the number of cases was small and the period of observation much too short. Radon has other advantages over radium in outpatient practice, but these have been discussed in our previous papers[4] and by Roxburgh.[5]

We are indebted to Mrs. Newton, secretary to the skin department of the London Hospital, for abstracting the clinical records of these cases; and one of us (R. T. B.) gratefully acknowledges assistance from the London Hospital research funds committee.

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THE CAUSES AND TREATMENT OF RECTAL INCONTINENCE[*]

BY J. P. LOCKHART-MUMMERY, M.B. CAMB.,
F.R.C.S. ENG.
SENIOR SURGEON TO ST. MARK'S HOSPITAL FOR DISEASES OF THE BOWEL

INCONTINENCE of the anus has for many years been unfairly exploited by the charlatan, the ignorant, and the quack. These people try to deter the unfortunate sufferer of some rectal ailment from submitting himself to the hands of the regular surgeon, and persuade him instead to try some palliative and ineffectual treatment at less experienced hands. Many a patient has suffered from a distressing fistula or a mass of painful and prolapsing piles for years rather than submit to an operation, which he has been persuaded would necessitate a serious risk of losing control over his evacuations. The real truth is that in these days the patient who is operated upon by a skilled proctologist runs no risk whatever of losing control of his sphincter. The modern proctologist has learnt how to avoid this complication of operations, and though he may occasionally fail to cure a patient he never leaves him with an incontinent anus.

Incontinence, or loss of adequate control over the anal orifice, is one of the most distressing complaints for which surgeons are consulted. It is difficult to imagine any condition more distressing to a sensitive person than one in which he is never certain whether his bowels will act unexpectedly at some inopportune moment. In most text-books the subject of incontinence is dismissed in a few lines, and is often not even mentioned in the index; a happy exception being Yeoman's monumental treatise, where a whole chapter is devoted to this subject, as was also the case in the Allinghams' book, published many years ago. It is of very great importance to the proctologist for two reasons. In the first place, every surgeon who practises proctology is anxious to know everything possible about the causes of this complication so that he may never run any risk of it in his own practice. Secondly, he will inevitably be consulted by patients who are incontinent owing to the handiwork of other surgeons, or as the result of injury.

IMPORTANCE OF THE EXTERNAL SPHINCTER

There has been a lot of vague writing on the relative importance of the internal and external sphincters, and it has often been asserted that incontinence will not result unless the internal sphincter is damaged. I have always taught that the external sphincter alone is of real importance, and that unless this muscle is intact perfect continence cannot be obtained. Incontinence of the anal opening is always due to inability of the external sphincter from some cause or another to adequately close the opening and so render it gas-tight. The external sphincter is a peculiar muscle; it is normally contracted and voluntarily relaxed—the exact reverse of most muscles. The only other muscle in the body, I believe, that functions in a similar manner is the bladder sphincter.

The internal sphincter is merely an exaggeration, if one may say so, of the circular muscle coat of the bowel. It is not under voluntary control from the brain at all, but only under control of the sympathetic fibres which pass to the unstripped muscle-fibres of the whole of the small and large intestine. While it is important in assisting the normal action of the rectum as an organ for the evacuation of the contents of the large bowel, I doubt if it is of any value in assuring the integrity of the anal opening from a voluntary point of view. No voluntary fibres have so far been traced to this muscle from the spinal cord, and the importance attached to it by the Allinghams and their school was, in my opinion, quite unjustified. I believe that a person with a hopelessly cut and damaged internal sphincter would have perfect control, provided that there was no damage to the external sphincter muscle.

Cases of incontinence require very careful study and close examination. They are often not so serious as they appear.

Some three years ago I was consulted by a young cavalry officer who had been operated upon one and a half years previously for fissure, and ever since had noticed a tendency to leak slightly at the anal orifice, a condition which naturally caused him considerable annoyance. Six months previously he had undergone another operation for this condition, without benefit, and he had now returned to London from India with a view to my operating on the muscle. I was quite unable to find anything wrong with his muscle or the nerve-supply, but on questioning him I found he had been taking large doses of liquid petroleum ever since the first operation. Stopping the petroleum at once put the condition right, but he was considerably annoyed at the thought that he had taken such a long journey to find out such a simple fact.

I can confidently assert that, although I have operated for fistula a great many times, I have never produced an incontinent anal opening; but I have always been extremely careful to avoid injury to the external sphincter, and when it has been necessary to divide this muscle I have left this procedure until two or three weeks after the primary operation. I do not divide the external sphincter at the primary operation under any circumstances. I believe this to be a sound practice; it does not add to the time required for healing, and it ensures that incontinence will not result from the operation. The reason why division of the sphincter at a second-stage operation does not result in incontinence is that the inflammatory exudate of the healing wound holds the ends of the divided muscle as in a splint and prevents their retraction, and so ensures that the minimum of scar tissue intervenes between the divided ends of the muscle. Division at the primary operation would allow of considerable retraction, as there is nothing to hold the divided muscle and prevent wide separation between the ends. I am sure many cases of incontinence could be avoided if surgeons realised the importance of not laying open large fistulæ in a single-stage operation. The plan of operation "en deux temps," which was first introduced many years ago at St. Mark's Hospital, is a much better practice, and the patient will accept the necessity for having two operations instead of one if the reasons are explained to him, more especially as the second stage can be done with local anæsthesia.

A bad practice, which I have known to result in serious incontinence, is that of operating for fistula when laying open a large acute ischiorectal abscess. When there is an acute abscess, nothing should be done beyond providing adequate drainage, and all attempts to deal with the fistula should be left until later.

Operations for piles should never result in incontinence if properly performed, and can only do so when portions of the sphincter are removed, or when serious sepsis follows the operation and the external sphincter gets involved in dense fibrous tissue. Injuries to the anal region may result in incontinence, and during and just after the war I saw a great many such cases. In most of them the sphincter had been divided posteriorly and had retracted. There was a large hole in the situation of the anus and the fibres of the external sphincter could be seen at the anterior part of the opening, but the muscle was quite unable to close it, and in fact only acted upon a very small part of the opening. Such cases required a complete plastic closure of the opening and careful suturing of the divided muscle around the posterior position. The results were excellent, but it sometimes required more than one operation to secure a perfect result. In a few cases the sphincter had been completely destroyed, and it was then impossible to secure perfect control, but when any large proportion of the external sphincter was left, good control could always be obtained with patience.

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[*] A post-graduate lecture delivered before the Fellowship of Medicine.

INTERFERENCE WITH THE NERVE-SUPPLY

When there is no mechanical cause for incontinence—that is to say when examination shows that the muscle is intact and properly contracting—we must conclude that there is a functional cause from derangement of the nerve-supply. I have never yet seen a case where the nerve-supply was damaged by an operation in the immediate vicinity of the muscle, and although we do not know the exact arrangement of the nerve-fibres, both sensory and motor, passing to the external sphincter, we can conclude that they have been very skilfully planned so as to avoid the surgeon's knife. I do know, however, of several cases of incontinence due to damage or derangement of the nerve-supply of the sphincter muscle—e.g., paraplegia, disseminated sclerosis, and more particularly tabes dorsalis.

Two years ago I saw a man, aged 40, who had for six months had sudden and quite unexplainable incontinence of his anus. A most careful examination failed to reveal anything wrong with his sphincter muscle, but when I examined his reflexes I found absence of knee-jerks and Argyll Robertson's pupils, and when I inquired, I found that he had been treated for syphilis four years previously. In this case there was no doubt that tabes was the cause of his incontinence. I have seen this condition three times. It is a cause which should be borne in mind, and when an apparently unexplainable case is seen, a careful examination of the reflexes should be instituted.

A cause of anal incontinence which may easily be missed is retention and overflow. Just as incontinence of urine can result from retention of urine and overflow, so can the same cause produce incontinence of fæces. This condition is most often seen in elderly persons, or in patients recovering from some serious illness. The patient begins to pass his stools under him without his knowledge and often becomes quite incontinent. In such cases a digital examination of the rectum reveals a large mass of hardened fæces in the rectum—a stercolith in fact. In some cases the mass may be so hard that it is necessary to break it up with a hammer and chisel. The removal of the stercolith will immediately cure the patient. I have seen a great number of such cases, but the same condition may also rarely occur in children.

I recently saw a small boy, aged 5 years, who had a congenital deformity of the anus, and who, ever since he was born, had been quite unable to control his bowel actions. The anal opening, though abnormal, was quite efficient as regards size and the contraction of the muscle. His whole colon was loaded with fæces, and the cause of his lack of ability to control his stools was retention and overflow. The boy had been kept constipated on purpose, as it was wrongly supposed that this was the best way to treat him. After thorough clearing out, which took several days, he had quite normal control over his stools.

There are several types of operation-incontinence. The commonest by far, in my opinion, is after operations for fistula, due to too free or unwise cutting by the surgeon. Badly performed operations for piles are also not uncommon causes, and Whitehead's operation for piles, which I am thankful to say is now only of historical interest, was a potent cause of partial incontinence. Tearing of the perineum from difficult or mismanaged labour is another and well-recognised cause.

TREATMENT

In discussing the treatment, I shall assume that the patient has been carefully examined and that the exact cause of the incontinence has been ascertained, and confine my remarks to those cases where from some cause or another the sphincter muscle is not able to close the opening.

Incontinence due to disease of the central nervous system is not curable.

One of the most troublesome causes, from my own personal experience, is congenital absence of the sphincter. It is not possible to make a new sphincter muscle, for the material is not available. Chetwood's operation, which aims at making a sphincter out of strips of the gluteus, is useless; for the gluteus only contracts voluntarily, whereas the sphincter relaxes voluntarily. The best treatment when the muscle is entirely absent is to narrow the opening, either by a plastic operation or by the use of the cautery, and to teach the patient to wash the bowel out daily with an enema. When the sphincter has been cut, badly stretched, or otherwise damaged, but is still present, a plastic operation should be performed with the object of bringing the fibres of the external sphincter together in such a manner that the muscle will be able when it contracts to close the anal opening completely. These operations are necessarily plastic operations, and success depends upon the stitches holding and primary union. This is difficult in the anal region for obvious reasons, and very great care in antiseptic technique and very careful after-treatment are essential.

The sphincter muscle must be freely exposed by a suitably planned incision. This is often a matter of considerable difficulty, especially when there is much scar tissue, but it is essential that free exposure should be obtained and the muscle-fibres well cleared of scar tissue. If, as is sometimes the case, there is a lot of dense fibrous tissue to which the scarred skin is firmly adherent, it is usually advisable to dissect all this scarred and damaged skin completely away and bring in flaps of normal skin from the neighbourhood to take the place of the damaged skin. It may be advisable to plan the operation in several stages, but in my experience it is useless to expect to get a continent anal opening if any large part of the skin forming the opening is composed of scar tissue. A proper continent opening must have good elastic skin all round it or the muscle will be unable effectually to close it.

The ends of the muscle must be carefully brought together without tension, as any tension on the stitches will certainly result in failure. I prefer to split the ends of the muscle and graft them into each other or to overlap the ends of the muscle and thus secure a firm union, as the muscle-fibres do not hold stitches very well. The suturing should be done with fine catgut and the wound very carefully closed. If necessary, a supporting suture of fishgut should be inserted to relieve all tension on the catgut sutures uniting the muscle. Any tension on the skin or on the stitches is quite fatal to success and the ends should be thoroughly freed to prevent any tension. If primary union is obtained the patient regains complete control over the anal opening at once. These operations are often very difficult and have to be planned especially to suit the case, but the results are very satisfactory.

When the muscle is badly stretched, as for instance after prolapse, and the incontinence results from the fact that, owing to stretching, the contraction of the muscle cannot adequately close the opening, the operation is much simpler. The muscle can be shortened by cutting a portion out of it and grafting the two ends into each other, or the redundant muscle can be sewn together laterally, so as to diminish the aperture to the required extent. The advantage of the latter expedient is that no part of the muscle is removed.

The most difficult cases are those where there is a dense mass of hard fibrous tissue. The blood-supply is sure to be bad, and this makes it difficult to get transplanted flaps of skin to heal into place, and also it is often a matter of the utmost difficulty to find the ends of the external sphincter amid a mass of fibrous tissue. I know of no cases which involve more care, or give the surgeon more anxiety than these. In cases where the perineum has been split or badly damaged by childbirth it is first of all necessary to perform a perineorraphy to form a new perineum, and after this has been successfully done the sphincter should be dissected out and repaired.

Apart from congenital absence of the sphincter muscle, and disease of the central nervous system, there are very few cases of incontinent anus that cannot be cured by a carefully planned operation, and there are certainly no operative results which give more satisfaction to both the patient and the surgeon.

THE LIFE HISTORY OF THE
HUMAN TREMATODE PARASITE
HETEROPHYES HETEROPHYES IN EGYPT

By Mohammed Khalil *Bey*, M.D. Egypt,
Ph.D., M.R.C.P. Lond.

PROFESSOR OF PARASITOLOGY IN THE FACULTY OF MEDICINE,
CAIRO, AND DIRECTOR OF THE RESEARCH INSTITUTE AND
THE ENDEMIC DISEASES HOSPITAL, PUBLIC
HEALTH DEPARTMENT, CAIRO

Heterophyes heterophyes (Siebold,[1] 1852) is the smallest trematode parasite inhabiting the small intestine of man, dog, and cat in Egypt. The infection has long been considered rare, but it was recently found to be very prevalent in the endemic zone round Lake Manzala, adjoining Port Said. In the fishing port of Mataria, 53 out of 60 school-children were found to be infected. In 1923 I discovered the source of infection to be the consumption of the mullet, *Mugil cephalus*,[2 3] when it was eaten salted or not thoroughly cooked. The metacercaria was found also in another fish, *Tilapia nilotica*. These fishes act as the second intermediate hosts. The first intermediate host remained unknown. An extensive research has been undertaken to determine the cercarial infections of the snails of Lake Manzala, where almost 90 per cent. of the mullet are infected. Four different types of lophocercous cercariæ were found. Cercariæ of some species of the family heterophyidæ belong to this type.[4] One type of those found in the snail *Pirenella conica* (Blainville, 1824) was induced to encyst in the fish *Gambusia affinis*, reared in the laboratory. The metacercaria developed in the muscles of the fish and showed after 15–20 days the characteristics of *H. heterophyes* metacercaria found naturally in the mullet. The gambusia fishes were fed to a young dog born and bred in the laboratory, so as to avoid any possibility of natural infection by eating infected fish. Three days after the last meal of infected gambusia the dog was killed and the small intestine was carefully inspected. *H. heterophyes* adults were found corresponding in age to the dates of feeding.

The whole cycle is now clear. The fishermen and their families around Lake Manzala are the main definitive hosts. There were 1325 fishing boats on the lake in 1928, operated by about 8000 men and 3500 children. These are continually polluting the water. The snail *Pirenella conica* is very common all over the lakes and all the Mediterranean sea-front. The miracidium develops forming sporocysts, rediæ, and finally cercariæ. The cercariæ mature only during the summer months. The maximum infection occurs in the months of June and July. The free cercariæ encyst in the flesh of mugil and tilapia, and possibly other fishes. The first, however, appears to be the main source of infection, as it is commonly eaten salted in the form known in Egypt as "fessikh." The metacercaria was found living in the salted fish up to seven days. The fessikh is consumed from the third day upwards.

Heterophyes infection in man occasionally produces diarrhœa which may be accompanied with blood. The course is of a chronic and intermittent nature. The patients become sometimes neurasthenic. Filix mas gives the best results in the treatment of this infection. A detailed report on this parasite will be published later.

I was helped in this work by Dr. I. Saleh Hilmy, lecturer in the parasitology department of the faculty of medicine, Cairo, to whom I offer my thanks.

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An Open-air Nursery School.—A Margaret McMillan nursery school is to be established in Brighton, which will be the first town on the south coast to have a school of this kind. The work will not, however, come as a novelty, for the Brighton and Hove Nursery Schools Association has been in existence for some years. Infant welfare centres have dealt with children up to the age of two, and the nursery schools have provided for that important interval from two to five. The Association is now able to extend its activities, thanks to having received from the late Miss Tarner a considerable piece of ground described as being "in the heart of Brighton's slumland." It includes a beautiful garden near Miss Tarner's house, and in this garden the Mayor of Brighton recently laid the foundation-stone of one of the shelters which will form the first part of the scheme of an open-air school. This shelter will allow for the attendance of 40 children, and it is hoped that as the scheme becomes generally known, enough money will be forthcoming to provide at least two more shelters providing similar accommodation. The suggestion was made at the ceremony that the school and its work might be taken over by the education authority.

BRITISH MEDICAL ASSOCIATION

ANNUAL MEETING IN DUBLIN

SECTION OF MEDICINE

AT a meeting of this section, with Prof. H. F. MOORE, the president, in the chair, a discussion on

High Carbohydrate Diets in Diabetes

was opened by Dr. R. D. LAWRENCE (London). He pointed out that even after the discovery of insulin it was at first customary to continue the low calorie diets of the Allen period—largely because of expense. Insulin rectified carbohydrate disturbance, however produced, but its administration required some intelligence and self-control from the patient and experience and skill from the doctor. It had already given ten years of healthy life to thousands who had been properly treated; on the other hand, many poorly controlled cases became severe after five or ten years, or developed neuritis, cataract, retinitis, gangrene, and arterio-sclerosis.

Diets for adults could roughly be divided into those supplying low (below 80 g.), moderate (about 150 g.), or high (above 200 g.) amounts of carbohydrate. Health could be maintained on all three. Which gave the greatest personal comfort and happiness? Sansum gave 200–300 g. carbohydrate daily with high protein and fat (3500 calories); very large doses of insulin were required and the patient's weight increased too much. Carbohydrates could be substituted for fat, but not in equicaloric quantities without raising the insulin. Rabinowitch gave 250 g. carbohydrate, but low protein and fat (calories about 1700). Patients usually lost weight and energy. Eason and Lyon, giving fixed protein but varying the carbohydrates and fat, concluded that about 150 g. carbohydrate and 100 to 150 g. fat (2000–2500 calories) were most successful. All three required meticulous weighing of the food. The speaker's own method gave a regular weighed amount of carbohydrate balanced by its correct dose of insulin—the glucose derived from protein and fat entered into insulin requirements slowly, and only carbohydrates required immediate balancing. The minimum carbohydrate was about 100 g. as the amount necessary to prevent ketosis. The patients ate protein and fat without regard to caloric value, and the intake was as a rule beautifully attuned to metabolic requirements; they did not vary their intake of protein and fat very much. This method was unsuitable for children and obese patients. Dr. Lawrence laid stress on the advantages of this method; the patient felt free and was not preoccupied with the disease. He concluded by hoping that an insulin effective when given by mouth would soon be discovered.

Prof. D. MURRAY LYON (Edinburgh) referred to the number of papers published within the last few years extolling the superiority of very high carbohydrate diets. It was claimed that these were cheaper and permitted a wider range of foodstuffs, and that the patient's tolerance improved so that, paradoxically, he might require less insulin. Some of these deductions were fallacious, and further examination was desirable. He described investigations of his own, with a variety of diets, on 50 cases, all on insulin. Reduction of blood cholesterol was claimed as an advantage of high carbohydrate diet; his work showed little difference in this respect. A loss of weight was noted in the cases on high carbohydrate, low caloric diets. In cases which received equicaloric diets the weight changes were unimportant. On very low fat diets severe hypoglycæmic attacks were more likely to occur; the insulin requirements might be less. He had found that many patients did best on an intermediate carbohydrate value, with a fat intake of at least 100 g.; they often disliked the high carbohydrate and low fat diet, owing to a lack of vigour and feeling the cold excessively. In spite of these objections and rather adverse findings, the high carbohydrate treatment was a definite advance in therapeutics. It was probably most useful for children and for adolescents who were often intolerant of large quantities of fat. It also offered an acceptable alternative to the old diets.

Dr. GEORGE GRAHAM (London) reported observations on a series of 15 out-patients, under treatment for about nine years. He gradually decreased the fats from 125 g. to 100 and increased the carbohydrates from 50 to about 150. At first he gave 1 unit of insulin for each increase of 2 g. carbohydrate, but found a correct balance was 8 units for every increase of 30 g. carbohydrate. Eight patients now required less insulin, 1 the same dose, 6 an increase of less than 25 units. He described another series of 40 patients observed for shorter periods. The insulin dose was lowered by 2 to 35 units in 10 cases, was the same in 4 cases, and had been raised by a maximum of 25 units in the remaining 26 cases. The gradual fall in insulin requirements in some cases was illustrated by a boy of 16, who on the gradually raised carbohydrate required an increase from 40 to 146 units, but now six years later was balanced on 65 units. The cause of the improvement might be the reduction in caloric value of the diets or the alteration in the carbohydrate-fat balance, but in the speaker's opinion its main advantage was that the blood-sugar could be better controlled by insulin. The high carbohydrate allowance permitted "buffer" meals to be taken between the main meals, and these arrested the development of insulin attacks.

Dr. R. H. MICKS (Dublin) urged that the criterion of success in treatment should be improvement in the patient's health rather than satisfactory biochemical figures. In the growing child the diet should be carefully scrutinised for possible vitamin deficiency. To the obedient, well-ordered patient a daily recurring hypoglycæmia, however mild, constituted a serious threat to emotional and mental health, and might readily produce a neurasthenic state. The disobedient diabetic, who by eating starch (though not fats) to excess avoided the perils of ketosis, was conducting an interesting experiment. Was he doing himself any harm beyond admittedly lessening the chances of regeneration of his islet cells? Many such patients led vigorous and healthy lives with the help of insulin, though in doses insufficient to balance their high carbohydrate intake. As to the control of glucose administration in acute emergencies, Dr. Micks had found that for a few days at any rate, excessive glucose did not do even temporary harm to carbohydrate tolerance. In such emergencies it was unnecessary to give only exactly enough glucose to balance the big insulin doses, and unless biochemical control was unremitting it was dangerous to attempt to do so. The simple rule "you cannot give too much glucose" was safe and effective during the emergency, and not productive of harmful after-effects.

The PRESIDENT summed up, and mentioned that in Ireland insulin was free to all necessitous patients. He was gratified with the results of a carbohydrate diet of about 120 to 150 g. He required his patients to weigh the carbohydrate carefully, but permitted accurate weighing of protein and fats once a week only.

Nephrosis

Dr. Geoffrey Thompson (Dublin) gave a paper on the problem of nephrosis. The word was first used, he said, to describe diffuse degenerative changes in the renal tubules of the kidney in contradistinction to the characteristic changes of glomerulonephritis. It was then recognised that a certain clinical and biochemical syndrome was occasionally found to be associated with this histological picture. The clinical features were (1) persistent œdema, variable but severe; (2) persistent proteinuria; (3) absence of hæmaturia, hypertension, and renal insufficiency; (4) marked diminution in plasma protein concentration and increased blood cholesterol; and (5) casts and lipoid droplets in the urine. He put forward five cases as instances of pure clinical nephrosis of insidious onset, severe degree, and unknown causation. Four eventually developed glomerulonephritis. Nephrosis might be regarded as a useful term to indicate a condition which was readily recognised and which required special treatment, but one which could not be pushed too far as a separate disease entity. The essential feature in the production of the syndrome appeared to be increased glomerular permeability to protein. These cases, so far as they went, seemed to show that so-called pure lipoid nephrosis, when not due to syphilis or to amyloid disease, was really a stage in the evolution of diffuse glomerulonephritis. In treatment, if proteinuria was heavy, protein must be given. To reduce œdema he gave a salt-free diet, ammonium chloride in very large doses, and Salyrgan intravenously.

Yeast Products in Anæmia

Prof. L. S. P. Davidson (Aberdeen) read a paper on the ~~therapeutic action~~ of vitamin B in anæmia. He explained, however, that he would prefer to substitute "autolysed yeast products" for "vitamin B," since it was now established that it was not the vitamin B in yeast products which was the hæmopoietic principle. His own work confirmed that of others, that autolysed yeast was useless in the treatment of hypochromic achlorhydric anæmia. With reference to hyperchromic macrocytic anæmia, Wills had proved the value of marmite (autolysed yeast) in the tropical macrocytic anæmia of Indian women, while Vaughan and Hunter in the treatment of the macrocytic anæmia occasionally associated with cœliac disease, and Castle and Rhoads in the treatment of sprue, reported satisfactory results. In pernicious anæmia the megaloblastic blood formation was due to a lack of a specific anti-anæmic factor which was formed by the interaction of a ferment secreted by the stomach upon some constituent of the proteins of foodstuffs. In the above types of anæmia the gastric secretion appeared to be normal. In Addisonian pernicious anæmia the essential fault lay in defective gastric secretion. He reported the detailed treatment of 16 cases, and compared these with cases treated by other workers. He concluded that autolysed yeast products contained some hæmopoietic principle but in small concentration. They should not therefore be substituted for liver, liver extract, or hog's stomach tissue in the treatment of pernicious anæmia.

SECTIONS OF SURGERY AND RADIOLOGY

At a combined meeting of these two sections, under the presidency of Mr. C. J. MacAuley, Dr. H. Poole (Dublin) read a short paper on the physical basis of radium treatment, in which he explained the relation of radon to radium, and the difference in action between the beta rays of radium and the more familiar gamma rays. Mr. E. L. Pearce Gould (London) then opened a discussion on

Radiation Therapy in Malignant Disease

The meeting should, he suggested, try to find answers to the four questions:

(1) In what groups of clearly definable cases of malignant disease does radium offer the best chance of prolonged freedom from the disease?

(2) In what groups of cases does the combination of radiation with surgery offer the best chance of lasting freedom?

(3) In what groups of cases have radiation methods a purely palliative but none the less valuable effect?

(4) In what group of cases have radiation methods proved so far of no use?

The answers to these questions could have only temporary value, but they would be a guide to the general practitioner in advising patients as to the most hopeful treatment in a particular case, and they would guide the surgeon in deciding along what lines to develop his skill in radical operations for the relief of cancer and in perfecting the technique of the surgery of access. The radiotherapist would also have an indication which cases were the most likely to respond to his treatment. Mr. Gould thought that a comparison of the figures representing the results of treatment by radiotherapeutic methods with those available of the results of surgery was the best method of coming at the answers to the questions he had propounded. He had obtained from the records of the Middlesex Hospital the after-history of patients operated on there for certain common types of cancer during the years 1925–31. Out of a total of 1100 cases of cancer, only 455 were considered suitable for radical surgical operation. The results were as follows:

Cancer of the Breast.—Of 151 cases operated upon, with 2 operative deaths, 73 were free from the disease after three years, and 50 at the end of five years (48·3 and 33·1 per cent. respectively). Stage 1 cases, with no palpable glands, represented 47 of the cases, of which 31 were free at the end of three years and 27 at the end of five years. Stage 2, with palpable glands, of 104 cases operated on, 41 were free at the end of three years, 23 at the end of five.

Tongue.—Of 38 cases operated on, 8 died of the operation, 11 were free at the end of three years, and 9 at the end of five.

Floor of the Mouth.—Of 14 cases operated on, 3 died of operation, 5 were free at the end of three years, and 4 at the end of five.

Lip.—Of 10 cases operated on, with 1 death, 7 were free at the end of three years, and the same at the end of five.

Parotid.—Of 6 cases operated on without operative death, 2 were alive and well after three years and after five years.

Stomach.—Of 132 cases only 18 were found suitable for operation; 8 died of the operation, 2 were alive at the end of three and at the end of five years.

Colon.—Of 78 cases, 38 were submitted to operation, of whom 11 died, 16 were free of recurrence at the end of three years, and 13 at the end of five.

Rectum.—Of 123 cases, 28 only were submitted to operation, of whom 9 died, 5 were alive at the end of three years, and 2 at the end of five.

Squamous Carcinoma of the Skin.—Of 16 cases operated on with no deaths, 9 were alive at the end of three years and at the end of five.

The figures, Mr. Gould remarked, showed that surgery was giving its best results in the same type of case as that in which radium was claiming its greatest success, viz., in cancer of the skin, mouth, and breast.

Dr. Oliver Chance (Dublin) said that of the three methods of dealing with cancer—viz., surgery, radium

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High Carbohydrate Diets in Diabetes

was opened by Dr. R. D. LAWRENCE (London). He *pointed out that* even after the discovery of insulin it was at first customary to continue the low calorie diets of the Allen period—largely because of expense. Insulin rectified carbohydrate disturbance, however produced, but its administration required some intelligence and self-control from the patient and experience and skill from the doctor. It had already given ten years of healthy life to thousands who had been properly treated; on the other hand, many poorly controlled cases became severe after five or ten years, or developed neuritis, cataract, retinitis, gangrene, and arterio-sclerosis.

Diets for adults could roughly be divided into those supplying low (below 80 g.), moderate (about 150 g.), or high (above 200 g.) amounts of carbohydrate. Health could be maintained on all three. Which gave the greatest personal comfort and happiness? Sansum gave 200–300 g. carbohydrate daily with high protein and fat (3500 calories); very large doses of insulin were required and the patient's weight increased too much. Carbohydrates could be substituted for fat, but not in equicaloric quantities without raising the insulin. Rabinowitch gave 250 g. carbohydrate, but low protein and fat (calories about 1700). Patients usually lost weight and energy. Eason and Lyon, giving fixed protein but varying the carbohydrates and fat, concluded that about 150 g. carbohydrate and 100 to 150 g. fat (2000–2500 calories) were most successful. All three required meticulous weighing of the food. The speaker's own method gave a regular weighed amount of carbohydrate balanced by its correct dose of insulin—the glucose derived from protein and fat entered into insulin requirements slowly, and only carbohydrates required immediate balancing. The minimum carbohydrate was about 100 g. as the amount necessary to prevent ketosis. The patients ate protein and fat without regard to caloric value, and the intake was as a rule beautifully attuned to metabolic requirements; they did not vary their intake of protein and fat very much. This method was unsuitable for children and obese patients. Dr. Lawrence laid stress on the advantages of this method; the patient felt free and was not preoccupied with the disease. He concluded by hoping that an insulin effective when given by mouth would soon be discovered.

Prof. D. MURRAY LYON (Edinburgh) referred to the number of papers published within the last few years extolling the superiority of very high carbohydrate diets. It was claimed that these were cheaper and permitted a wider range of foodstuffs, and that the patient's tolerance improved so that, paradoxically, he might require less insulin. Some of these deductions were fallacious, and further examination was desirable. He described investigations of his own, with a variety of diets, on 50 cases, all on insulin. Reduction of blood cholesterol was claimed as an advantage of high carbohydrate diet; his work showed little difference in this respect. A loss of weight was noted in the cases on high carbohydrate, low caloric diets. In cases which received equicaloric diets the weight changes were *unimportant*. On very low fat diets severe hypoglycæmic attacks were more likely to occur; the insulin requirements might be less. He had *found that many patients did best* on an intermediate carbohydrate value, with a fat intake of at least 100 g.; they often disliked the high carbohydrate and low fat diet, owing to a lack of vigour and feeling the cold excessively. In spite of these objections and rather adverse findings, the high carbohydrate treatment was a definite advance in therapeutics. It was probably most useful for children and for adolescents who were often intolerant of large quantities of fat. It also offered an acceptable alternative to the old diets.

Dr. GEORGE GRAHAM (London) reported observations on a series of 15 out-patients, under treatment for about nine years. He gradually decreased the fats from 125 g. to 100 and increased the carbohydrates from 50 to about 150. At first he gave 1 unit of insulin for each increase of 2 g. carbohydrate, but found a correct balance was 8 units for every increase of 30 g. carbohydrate. Eight patients now required less insulin, 1 the same dose, 6 an increase of less than 25 units. He described another series of 40 patients observed for shorter periods. The insulin dose was lowered by 2 to 35 units in 10 cases, was the same in 4 cases, and had been raised by a maximum of 25 units in the remaining 26 cases. The gradual fall in insulin requirements in some cases was illustrated by a boy of 16, who on the gradually raised carbohydrate required an increase from 40 to 146 units, but now six years later was balanced on 65 units. The cause of the improvement might be the reduction in caloric value of the diets or the alteration in the carbohydrate-fat balance, but in the speaker's opinion its main advantage was that the blood-sugar could be better controlled by insulin. The high carbohydrate allowance permitted "buffer" meals to be taken between the main meals, and these arrested the development of insulin attacks.

Dr. R. H. MICKS (Dublin) urged that the criterion of success in treatment should be improvement in the patient's health rather than satisfactory biochemical figures. In the growing child the diet should be carefully scrutinised for possible vitamin deficiency. To the obedient, well-ordered patient a daily recurring hypoglycæmia, however mild, constituted a serious threat to emotional and mental health, and might readily produce a neurasthenic state. The disobedient diabetic, who by eating starch (though not fats) to excess avoided the perils of ketosis, was conducting an interesting experiment. Was he doing himself any harm beyond admittedly lessening the chances of regeneration of his islet cells? Many such patients led vigorous and healthy lives with the help of insulin, though in doses insufficient to balance their high carbohydrate intake. As to the control of glucose administration in acute emergencies, Dr. Micks had found that for a few days at any rate, excessive glucose did not do even temporary harm to carbohydrate tolerance. In such emergencies it was unnecessary to give only exactly enough glucose to balance the big insulin doses, and unless biochemical control was unremitting it was dangerous to attempt to do so. The simple rule "you cannot give too much glucose" was safe and effective during the emergency, and not productive of harmful after-effects.

The PRESIDENT summed up, and mentioned that in Ireland insulin was free to all necessitous patients. He was gratified with the results of a carbohydrate diet of about 120 to 150 g. He required his patients to weigh the carbohydrate carefully, but permitted accurate weighing of protein and fats once a week only.

Nephrosis

Dr. GEOFFREY THOMPSON (Dublin) gave a paper on the problem of nephrosis. The word was first used, he said, to describe diffuse degenerative changes in the renal tubules of the kidney in contradistinction to the characteristic changes of glomerulonephritis. It was then recognised that a certain clinical and biochemical syndrome was occasionally found to be associated with this histological picture. The clinical features were (1) persistent œdema, variable but severe; (2) persistent proteinuria; (3) absence of hæmaturia, hypertension, and renal insufficiency; (4) marked diminution in plasma protein concentration and increased blood cholesterol; and (5) casts and lipoid droplets in the urine. He put forward five cases as instances of pure clinical nephrosis of insidious onset, severe degree, and unknown causation. Four eventually developed glomerulonephritis. Nephrosis might be regarded as a useful term to indicate a condition which was readily recognised and which required special treatment, but one which could not be pushed too far as a separate disease entity. The essential feature in the production of the syndrome appeared to be increased glomerular permeability to protein. These cases, so far as they went, seemed to show that so-called pure lipoid nephrosis, when not due to syphilis or to amyloid disease, was really a stage in the evolution of diffuse glomerulonephritis. In treatment, if proteinuria was heavy, protein must be given. To reduce œdema he gave a salt-free diet, ammonium chloride in very large doses, and Salyrgan intravenously.

Yeast Products in Anæmia

Prof. L. S. P. DAVIDSON (Aberdeen) read a paper on the ~~therapeutic action~~ of vitamin B in anæmia. He explained, however, that he would prefer to substitute "autolysed yeast products" for "vitamin B," since it was now established that it was not the vitamin B in yeast products which was the hæmopoietic principle. His own work confirmed that of others, that autolysed yeast was useless in the treatment of hypochromic achlorhydric anæmia. With reference to hyperchromic macrocytic anæmia, Wills had proved the value of marmite (autolysed yeast) in the tropical macrocytic anæmia of Indian women, while Vaughan and Hunter in the treatment of the macrocytic anæmia occasionally associated with cœliac disease, and Castle and Rhoads in the treatment of sprue, reported satisfactory results. In pernicious anæmia the megaloblastic blood formation was due to a lack of a specific anti-anæmic factor which was formed by the interaction of a ferment secreted by the stomach upon some constituent of the proteins of foodstuffs. In the above types of anæmia the gastric secretion appeared to be normal. In Addisonian pernicious anæmia the essential fault lay in defective gastric secretion. He reported the detailed treatment of 16 cases, and compared these with cases treated by other workers. He concluded that autolysed yeast products contained some hæmopoietic principle but in small concentration. They should not therefore be substituted for liver, liver extract, or hog's stomach tissue in the treatment of pernicious anæmia.

SECTIONS OF SURGERY AND RADIOLOGY

AT a combined meeting of these two sections, under the presidency of Mr. C. J. MACAULEY, Dr. H. POOLE (Dublin) read a short paper on the physical basis of radium treatment, in which he explained the relation of radon to radium, and the difference in action between the beta rays of radium and the more familiar gamma rays. Mr. E. L. PEARCE GOULD (London) then opened a discussion on

Radiation Therapy in Malignant Disease

The meeting should, he suggested, try to find answers to the four questions:

(1) In what groups of clearly definable cases of malignant disease does radium offer the best chance of prolonged freedom from the disease?

(2) In what groups of cases does the combination of radiation with surgery offer the best chance of lasting freedom?

(3) In what groups of cases have radiation methods a purely palliative but none the less valuable effect?

(4) In what group of cases have radiation methods proved so far of no use?

The answers to these questions could have only temporary value, but they would be a guide to the general practitioner in advising patients as to the most hopeful treatment in a particular case, and they would guide the surgeon in deciding along what lines to develop his skill in radical operations for the relief of cancer and in perfecting the technique of the surgery of access. The radiotherapist would also have an indication which cases were the most likely to respond to his treatment. Mr. Gould thought that a comparison of the figures representing the results of treatment by radiotherapeutic methods with those available of the results of surgery was the best method of coming at the answers to the questions he had propounded. He had obtained from the records of the Middlesex Hospital the after-history of patients operated on there for certain common types of cancer during the years 1925–31. Out of a total of 1100 cases of cancer, only 455 were considered suitable for radical surgical operation. The results were as follows:

Cancer of the Breast.—Of 151 cases operated upon, with 2 operative deaths, 73 were free from the disease after three years, and 50 at the end of five years (48·3 and 33·1 per cent. respectively). Stage 1 cases, with no palpable glands, represented 47 of the cases, of which 31 were free at the end of three years and 27 at the end of five years. Stage 2, with palpable glands, of 104 cases operated on, 41 were free at the end of three years, 23 at the end of five.

Tongue.—Of 38 cases operated on, 8 died of the operation, 11 were free at the end of three years, and 9 at the end of five.

Floor of the Mouth.—Of 14 cases operated on, 3 died of operation, 5 were free at the end of three years, and 4 at the end of five.

Lip.—Of 10 cases operated on, with 1 death, 7 were free at the end of three years, and the same at the end of five.

Parotid.—Of 6 cases operated on without operative death, 2 were alive and well after three years and after five years.

Stomach.—Of 132 cases only 18 were found suitable for operation; 8 died of the operation, 2 were alive at the end of three and at the end of five years.

Colon.—Of 78 cases, 38 were submitted to operation, of whom 11 died, 16 were free of recurrence at the end of three years, and 13 at the end of five.

Rectum.—Of 123 cases, 28 only were submitted to operation, of whom 9 died, 5 were alive at the end of three years, and 2 at the end of five.

Squamous Carcinoma of the Skin.—Of 16 cases operated on with no deaths, 9 were alive at the end of three years and at the end of five.

The figures, Mr. Gould remarked, showed that surgery was giving its best results in the same type of case as that in which radium was claiming its greatest success, viz., in cancer of the skin, mouth, and breast.

Dr. OLIVER CHANCE (Dublin) said that of the three methods of dealing with cancer—viz., surgery, radium therapy, and deep X ray therapy—one was not to be looked on as in any sense a substitute for the other. Each had its place. In fact, where the treatment was in the hands of an expert in his particular line, there was little to choose between the results obtained by any one of the three. Success was a matter of personal skill, and this prevented the treatment of cancer from ever becoming standardised. The basis of all treatment by radium was in the selective action of the rays, which sterilised actively mitotic tissue, while leaving relatively stable tissue practically untouched. The selection of a case as suitable for radium treatment depended on the degree of mitosis present in its cells. Basal-celled tumours of the skin, being composed of cells of short life and marked karyokinetic activity, responded well to radium. Carcinoma of the stomach, with highly specialised cells and a much lesser degree of active cell division, was as a rule unsuitable. Another important point to be reckoned with was the efficiency of the blood-supply. Bone was not a good tissue to irradiate, because it had a relatively poor supply, and the further damage caused by the rays produced osteonecrosis. On the other hand, where the blood-supply and lymphatic drainage was good, the natural resistance of the body was at an optimum for dealing with the sterilised cells of the growth. Tumours complicated by sepsis or inflammation rarely responded well to treatment by radium. The radiosensitivity of the surrounding tissue had also to be taken into consideration. Some sites, such as the liver and intestine, were unsuitable because the cells of which they were composed were too sensitive.

There were, said Dr. Chance, four methods by which radium could be applied to a tumour. The radium might be placed on the surface of the growth; needles containing radium might be inserted into the tumour; teletherapy, by means of the radium bomb, could be used; or tubes containing radium might be inserted into one of the natural cavities of the body. The last method was used mainly for uterine cancer, usually combined with surface application. Surgeons were mainly concerned with implantation surgery, which was, at present, a very inexact method. When it became better standardised, it seemed preferable that the operation should pass into the hands of radiotherapists who would combine a specialised knowledge of radium with skill in the surgery of access to the few regions of the body where it was used. The technique of radium therapy had less effect on the result obtained than the intelligence with which it was applied. The individual patient was not always taken into consideration. He concluded with an appeal for special radiotherapeutic departments in which a special study and follow-up of the cases could be carried out.

Mr. W. M. Levitt (London) said that of the four methods of application of radiation to a growth—interstitial radium (the insertion of needles), short-distance surface application of radium, intracavitary application of radium, X rays and radium bomb—it was possible to choose the method likely to give the most satisfactory result in any given case. To do this it was necessary to know whether the growth was highly radiosensitive—by which he meant whether it could be made to disappear by a dose of radiations that produced little or no damaging effect on the normal tissues—or was only moderately radiosensitive, or even radio-resistant. The first group of highly radiosensitive growths included: (*a*) small round-celled and lymphosarcoma; (*b*) seminoma; (*c*) some carcinomas of the breast; (*d*) some carcinomas of the ovary; (*e*) certain cerebral tumours—e.g., medulloblastoma. This group should invariably be treated by external irradiation—i.e., X rays or radium bomb—of which X rays were more economical and convenient. In the second group he placed (*a*) round-celled sarcoma; (*b*) endosteal and chondrosarcomas; (*c*) some periosteal sarcomas; (*d*) most carcinomas of the breast; (*e*) carcinomas of the prostate; (*f*) of the bladder; (*g*) certain palatal, pharyngeal, and laryngeal growths—e.g., lympho-epithelioma; (*h*) hypernephroma; (*i*) carcinoma of the cervix; (*j*) of the corpus uteri; (*k*) of the ovary; (*l*) of thyroid gland; (*m*) of the lip; (*n*) of the skin. Interstitial radium was the method of choice in this group of tumours, except that carcinoma of the skin was best treated by X rays. Glandular metastases must also be treated by interstitial radium if possible, otherwise by surface application or X rays. Preliminary treatment by X rays sometimes reduced an extensive growth to a size at which it could be treated successfully by insertion methods. The radio-resistant growths were: (*a*) carcinoma of the rectum; (*b*) of the œsophagus; (*c*) of the tongue; (*d*) many pharyngeal carcinomas; (*e*) some carcinomas of the breast; (*f*) some carcinomas of the ovary; (*g*) carcinoma of the bronchi; (*h*) certain metastases in cervical glands; (*i*) spindle-celled sarcoma and fibrosarcoma. Here again interstitial radium was the method of choice, but the treatment had to be more thorough and full dosage used. Where interstitial radium could not be used, X rays might afford a degree of palliation.

The percentage of survivors in any two parallel groups of cases—one treated by radiation and the other by surgery—might be the same. It did not necessarily follow that the people who had been saved by the one method were the same as the people who had been saved by the other. The ideal was to combine the use of methods so as to save all the patients who would survive by their separate use.

Mr. Geoffrey Keynes (London) believed we now could form some definite idea of the form of treatment to advise in growths of different regions of the body. He suggested: (1) Inoperable growths should be treated by radium. (2) Radiation was suitable for growths of the upper alimentary tract (lips, mouth, tongue, tonsil). (3) For the central portions of the alimentary tract (stomach, colon, rectum) operation offered the best chance. (4) The anal canal was suitable for radium treatment. (5) Growths on the surface of the body should be treated by radiation alone. This gave good results without mutilation. (6) Growths of the breast he had treated by a combination of all three methods: radium, surgery, and deep X ray. On the whole, there was a slight balance in favour of the treatment by radium. Of the cases without glands treated by radium, 70 per cent. were free from recurrence at the end of three years, 66 per cent. at the end of five.

Dr. R. Stumpf (Dublin) thought that radium was the method of choice in carcinoma of the cervix and of the lip. He asked that the practitioner in charge of these cases should both report on their progress to the radiotherapeutist who had treated them, and should send them for inspection. He warned against the practice of removing a piece of a suspected sarcoma for diagnosis. It was permissible to remove a gland but not to cut into the growth.

Mr. P. H. Whitaker (Liverpool) said that of the cases received for treatment, 50 per cent. were unsuitable. The best results with radium were obtained in carcinoma of the buccal cavity, the lips, cervix, upper air-passages, and in sarcomata. Carcinoma of the breast, he thought, was best treated by a combination of radical amputation and radiation.

At present our treatment of cancer was limited to the local manifestation of the disease. Real advance in the future would come when we could treat cancer as a general disease.

Dr. B. W. WINDEYER (London) found the best results in basal-celled carcinomata, epitheliomata of the lip, and carcinomata of the cervix. The mortality of Wertheim's operation in skilled hands was 17 per cent., whereas the mortality from radium treatment was 2 per cent. The percentage of cases free from recurrence five years after radium treatment of the cervix was given as 3-6 by some writers, and as 24 by others.

Mr. W. H. OGILVIE (London) said that no one disputed that the inoperable case should be treated by some form of radiation. It was only the operable case that was under discussion, and in these the real problem was that of access to the tumour. He was of the opinion that the case should be in the hands of some one capable of applying either form of treatment, radium or surgery, and with an open mind on their relative claims. He thought the radical operation on the breast was giving sufficiently satisfactory results to be retained. The operation should be followed by radiation, either from a radium jacket or by deep X ray.

Mr. J. R. K. PATERSON (Manchester) made a plea for more accurate methods of dosage in radium treatment. Measurement by milligramme hours or millecurie hours was inaccurate. In Germany the R unit was being used to express dosage both of X rays and of radium. He thought there was evidence that the effective dosage for any given tissue, as, for example, epithelium, was constant, irrespective of site.

The CHAIRMAN warned radiologists present who might develop rodent ulcers of the skin in the course of their work not to have the ulcers removed by radiation, but to have them excised by a surgeon.

Mr. PEARCE GOULD, in reply, said he thought his questions had been in large measure answered. It seemed to have been agreed that radium was the method of treatment indicated in malignant disease of the skin, mouth, pharynx, anus, in carcinoma of the cervix, and for palliative treatment. For the alimentary canal, from the œsophagus down, surgery held the field. Other cases could best be treated by a combination of methods. Hope lay in early treatment.

SECTION OF OPHTHALMOLOGY

AT the first meeting of this section, Mr. F. C. CRAWLEY, P.R.C.S.I., being in the chair, a discussion on

Fields of Vision in connexion with Intracranial Lesions

was opened by Mr. A. A. MCCONNELL (Dublin), who discussed recent experimental work on the anatomy of the visual paths. It is, he said, now accepted that the external geniculate body is the only subcortical centre for vision, and that no visual fibres pass, as formerly described, to the pulvinar or the superior quadrigeminal body. The optic radiation (geniculo-calcarine pathway) is identical with the external sagittal stratum of the occipital lobe. As regards the course of different groups of fibres, after a rearrangement has taken place in the optic tract beyond the chiasma, the position of the fibres on reaching the geniculate body is such that homologous fibres from the retinæ have come together, and subsequently run together in the visual radiation. In discussing Meyer's temporal loop, he quoted experimental work which questioned its very existence. It may be taken that there is a fixed geometric projection of the retinæ upon the cortex of the striate area; no segment, not even the fovea centralis, has a diffuse or bilateral representation in the cortex. Mr. McConnell illustrated his remarks by perimetric charts and anatomical diagrams based on a number of cases of tumours affecting the optic tract and the optic radiation. To simplify description he suggested an imaginary division of the temporal lobe into a pregeniculate and a postgeniculate area—the two areas being of almost equal extent—by a coronal plane at the anterior portion of the geniculate body. This has its value in diagnosis, for if a definite tract defect can be established in contradistinction to a radiation defect, each part of the temporal lobe has what may be called its own burglar alarm.

Dr. H. M. TRAQUAIR (Edinburgh) followed with a detailed account of the various points to be considered in perimetry. He pointed out that the normal field of vision is not a field having merely normal extent, but also normal acuteness all over its area. When a defect is present there has to be determined its *intensity*, or degree of blindness present, its *uniformity*, or relative distribution of the blindness within its area, and its *margins*, whether abrupt or sloping. Other points to consider are: *proportion*, when a defect for colour is of the same degree as it is for a white object; *congruity*, when defects are simultaneous in appearance, coextensive, and equal in intensity in the two fields. Illustrative of the value of intensity is the fact that the blind field in hemianopia may be found on analysis to consist of two quadrants of different intensities. Likewise the establishment of congruity or incongruity has a localising value, since all hemianopias due to suprageniculate lesions must be congruous—a generalisation to which, however, there is an important exception, and one that has a localising value of its own. This is due to the fact that the temporal and nasal portions of the field are not normally coextensive, the temporal field being larger by a crescentic area about 30 degrees wide at its widest part ("temporal half moon"). It is possible therefore in a suprageniculate hemianopia for the temporal half moon of the binocular field to be affected alone, or for this part to be spared in an otherwise congruous homonymous hemianopia. *Behaviour* of a defect is of the utmost value, for field changes which are rapid in onset and progress rapidly or variably correspond to lesions which behave in a similar way. The findings derived from perimetry are therefore to be considered not only in establishing a diagnosis as to the seat, but also as to the nature of the lesion ("anatomical and pathological interpretations"). As far as anatomical diagnosis is concerned, the visual pathway may be regarded as consisting of a suprageniculate part, including the cortex and the radiations, and a subgeniculate portion, which is divided into subchiasmal, chiasmal, and suprachiasmal sections, all of which divisions give more or less characteristic field changes. The value of pathological interpretation is seen in disseminated sclerosis; the rapid onset, variability, and spontaneous disappearance agree well with the symptomatology of disseminated sclerosis in general. Cerebral tumours, with their slow relentless development of hemianopic defects, are another illustration; they contrast strongly to the defects seen in hæmorrhage and thrombosis, which are similar in appearance but totally different in behaviour. The inconsistent and contradictory findings in hysteria are sufficiently characteristic to indicate the diagnosis. Dr. Traquair also discussed the significance of Meyer's temporal loop. He doubted its existence, and held that it is the optic tract and not the radiation which is affected in temporal lobe tumours.

DISCUSSION

Four other papers on the subject were read. Mr. Norman M. Dott (Edinburgh) discussed the detection by arteriography of compression of both optic nerves and the carotid arteries. He distinguished between hemianopia and the irregular depression of the field following on post-neuritic optic atrophy. Speaking of hemianopia, he expressed his doubt as to the existence of permanent hemianopia in migraine. —Miss Euphan M. Maxwell (Dublin) spoke of two cases of pituitary tumour and of a case of invasion of the left occipital lobe by the lung fluke of Japan.—Mr. Hugh Cairns (London) stressed the fact that the earliest perimetric signs of pituitary tumour are scotomata and not peripheral defects.—Mr. G. Jefferson (Manchester), who like the other speakers illustrated his remarks by records of cases, discussed meningioma of the tuberculum sellæ. The recovery of field defects after operation was brought out.

In the subsequent discussion, Mr. P. G. Doyne (London) inquired as to the significance of directional movement at the edge of the field, whilst Dr. L. E. J. Werner (Dublin) reported a case of recovery of field defect after a penetrating injury to the occipital pole.

At the second meeting Mr. Arnold Sorsby (London) opened a discussion on the

Control of School Myopia

setting out the various attempts that had been made to control myopia. Cohn, who believed that environmental factors were responsible, had hoped that the problem would be solved by attention to school hygiene. Good lighting, clear printing, the abolition of gothic script, properly constructed desks, commodious school rooms had their place in these efforts, but 50 years of work in this direction had led to negative results as far as controlling the onset of myopia is concerned. Their value in controlling the progress of existing myopia was quite a different problem. Mr. Sorsby held that for the understanding of the development of school myopia it is essential that more should be known of the changes that take place in the growing eye. It is held that the growth of the eye is completed by the age of 8; during this process the eye has become longer by about 8 mm. Such lengthening would represent an increase of refraction by about 30–40 dioptres. Yet the total refraction of the eye changes by hardly more than 2 or 3 dioptres during infancy and childhood. Obviously, marked and correlated changes take place in the anterior segment of the eye to compensate for the increase in refraction produced by axial elongation. The study of these changes which involves knowledge of changes in refraction of the cornea and lens, and in the depth of anterior chamber during growth, has almost entirely been neglected.

Myopia, coming on after the age of 8, represents either a failure in that correlation—in which case the eye cannot have completed its growth by the age of 8—or else it stands for an independent process coming on after the period of growth and consolidation. The evidence of refraction curves—such as are to be obtained by plotting the incidence of refractive errors in the general population—supports the view that myopia is due to a failure in correlation. Refraction curves show a peak towards emmetropia, such as could not be explained on any view which does not assume *correlation of the components* of total refraction. Furthermore, such curves, with a peak towards emmetropia, can be constructed theoretically *if it is assumed that the components* are not free variables. Correlation is thus an active process, and myopia as well as hypermetropia may be regarded as its anomalies. The view that myopia can be explained as the chance combination of free variables, themselves determined by heredity, is not tenable; nor is the monistic conception of all myopia as the result of the inheritance of large retinæ. The behaviour of the myopic eye precludes its being regarded as the mere antithesis of hypermetropia. There is much to be said for the conception that myopia consists of two distinct forms, a physiological and a pathological type. Whilst attention to environmental factors has not solved the problem, the fatalism of those who regard myopia as a hereditarily determined condition is not warranted by fact. Knowledge of the physiology of the growing eye has still to contribute to the understanding of the problem, and to the rational control of myopia.

Mr. N. Bishop Harman (London) considered that much can be done in the mass control of school myopia, though this may not be applicable to individual cases. He quoted the example of Sweden, where a remarkable reduction in the incidence of myopia has occurred as the result of measures of school hygiene. Amongst the problems of the mass control of myopia is the fact that the incidence of myopia is lower in slum areas than in model areas. In individual cases the underlying factor may be congenital weakness of the sclerotic. *It is best to* let such children "run wild," and force but little homework on them. The control of even low myopia in schools is difficult, especially as myopic children are studious. He gave an analysis of 618 cases he had investigated. Hypermetropia showed but a slight increase; the curve for hypermetropic astigmatism rises rapidly, whilst the curve for myopia rises steadily. He held that astigmatism may be regarded as the foster mother of myopia. In cases of myopia no definite starting point can be proved, if the myopia following interstitial keratitis is excluded. Yet *it was his impression that febrile conditions have* some connexion with the development of myopia. During convalescence excessive indulgence in reading should be avoided. Whilst the individual case still remains a problem, mass reduction of myopia is to be sought along further extensions of measures of school hygiene.

Mr. J. D. M. Cardell (London) pointed out that the incidence of myopia depends upon age, sex, and hereditary antecedents. His investigation of a group of children in a London area shows that the incidence of myopia is not increasing. The control of school myopia begins with the detection of the process in the child. Not only has the child to be kept under observation, but the parents must be educated as to its care. There is a premyopic stage which manifests itself by refraction being just on the hypermetropic side and vision beginning to decline; such children also complain of headaches, and their fundi are normal. *Treatment of the myope* consists in resting the eyes and in reading being done only under proper conditions. Myopic children should be seen at intervals of one year; they should wear full correction, and should be encouraged to out-of-door pursuits. In judging the efficacy of treatment the fact that myopia may be quiescent should be borne in mind.

DISCUSSION

Mr. R. D. Joyce (Dublin) held that avoidance of convergence had not been stressed sufficiently. He had not seen myopia in a child that had lost one eye. He advocated the use of separate glasses for distance and near for children with malignant myopia.—Mr. L. B. SOMERVILLE-LARGE (Dublin) asked for information as to the appropriate treatment of the early myope.—Mr. DOYNE spoke of the difficulty of forcing glasses on children.—Colonel R. E. WRIGHT (I.M.S.) stressed the necessity of determining the refraction of the young child. The subjective tests, even if pictures are used, are difficult.—Miss GILLESPIE drew attention to the use of atropine in myope schools.—Mr. J. B. MCAREVEY (Dublin) inquired what would be the smallest city that could support a myope school.—Dr. HARRIS TOMKIN (Dublin) wanted to know if school inspection by doctors, not themselves oculists, worked better in England than in Ireland.

In replying, Mr. SORSBY quoted his own findings in support of Mr. Harman's findings as to the relationship between astigmatism and hypermetropia. The existence of progressive unilateral myopia seemed to him to militate against the significance of convergence and accommodation as factors in the causation of myopia. Infectious disease seemed to play a part as was shown by the results obtained in Bradford by James Kerr in providing open-air schools for children who had recently had scarlet fever.

Mr. HARMAN explained that the myope classes avoided segregation, and anything that led to the development of an inferiority complex. These classes are part of the normal elementary school and not of the blind schools. Classes have now been started in the higher grade schools in London. The system of school inspection works well in London. In the treatment of myopia he considered that prisms may be of use in some cases. He had seen progressive myopia in children with only one eye.

Mr. CARDELL held that the premyopic child tends to read at too close a distance. Such cases should be examined under atropine, and be kept under observation for a prolonged period; they should be seen every six weeks.

REVIEWS AND NOTICES OF BOOKS

Diseases of the Nervous System

By W. RUSSELL BRAIN, M.A., M.D. Oxf., F.R.C.P. Lond., Assistant Physician to the London Hospital; Physician to the Hospital for Epilepsy and Paralysis, Maida Vale. London: Humphrey Milford, Oxford University Press. 1933. Pp. 899. *27s. 6d.*

ALTHOUGH neurology depends largely upon anatomy and physiology—more so than many other branches of medicine—these basic subjects are almost wholly disregarded in many neurological text-books. The result is that the student and the general practitioner are repelled and mystified by a mass of unexplained and difficult concepts couched in a technology which is always mysterious and apt to be irritating. Dr. Russell Brain has the imagination to visualise the difficulties of the practitioner, and to write a book that shall be intelligible and helpful to him. As he points out in his preface, the subject has developed remarkably during the last two decades. The war, which provided a wealth of clinical material for nearly all specialists, gave opportunity for study of the spinal cord which has greatly increased the knowledge of reflex action. Clinical neurologists have had to cope with encephalitis lethargica and a number of new forms of acute disseminated encephalitis, and in doing so they have formed an alliance with the bacteriologists, who on their side have had to investigate the filtrable viruses. The art of diagnosing and locating intracranial tumours has been advanced by improvements in the technique of neurological surgery. Realising the importance of physiology to his specialty, Dr. Brain has begun his book with a long and comprehensive section on disorders of function in the light of anatomy and physiology, and has introduced several of his clinical sections with physiological and anatomical explanations. The result is a book of which the arrangement is logical, the language is direct and simple, and the matter is intelligible to anyone who knows his anatomy and physiology. The concluding section on the neuroses is written with unusual understanding of what is called the psychological point of view. Dr. Brain ends his book with a useful chapter on neurological diseases in their relation to life assurance. He gives a helpful bibliography, classified anatomically, and most of the illustrations are excellent.

Social Science for Health Visitors

By EVELYN WILKINS, B.A., Head of the Department of Hygiene and Public Health, Battersea Polytechnic. London: Edward Arnold and Co. Pp. 128. 4s.

THE author's main object in writing this little book has been to help candidates preparing for the health visitor's examination conducted by the Royal Sanitary Institute; and in this capacity it will no doubt prove useful to students. A large amount of accurate information is included within its compass. The purpose of the health visitor's office is, as Miss Wilkins points out, "the building up of healthy individuals, well-balanced physically, mentally, and morally," and to be successful such a career demands a thoughtful study of social problems. The mother, the infant, and the child must be considered in relation to the family, the neighbours, and the community as a whole; and a historical approach to the subject is commended as a corrective against hasty judgments and unwarranted conclusions. Chapters deal with the principles of relief, administration, maternity and child welfare, the school-child, the adolescent, the worker, special problems, poverty, insecurity, and housing, and at the end of each is given a list of books for further study. Under special problems is discussed the effect upon family life of a member suffering from tuberculosis, venereal disease, mental defect, blindness, or alcoholism. The chapter on insecurity contains a lucid account of the provisions of the various forms of insurance available in this country. The book is too full of meat for consecutive reading.

Anatomy of the Human Skeleton

Third edition. By J. E. FRAZER, D.Sc. Lond., F.R.C.S. Eng., Professor of Anatomy in the University of London, and Lecturer in the Medical School of St. Mary's Hospital. London: J. and A. Churchill. 1933. Pp. 292. 28s.

Prof. Frazer's book on the anatomy of the human skeleton, now in its third edition, is the culmination of a development of topographical anatomy which got its driving force from the advance of surgery into every recess of the body. The object of the work is to piece the body together, bit by bit, using the hardness and the rigidity of the bones as a frame on which to place in their proper order, exact disposition and precise coaptation all the more plastic structures of the body. Some biological history of the bones and other parts, and comments on growth and differentiation and on form and function are included, but these do not interfere with the main intention of the book. The text is accompanied by an abundance of pictures chosen to illustrate how the muscles, blood-vessels, and nerves come into relation with the bones. These pictures, drawn by the author from his own preparations, form a unique series in anatomical literature.

The book is important because it presents an additional method of learning the anatomical details of the structure of the human body. We may dissect, radiograph, inject, cut serial sections and the like. But with Prof. Frazer we can start from the skeleton and, by seeing and feeling, find the place where the other structures must go until at last we come near to fitting the body together, the bones being the coördinates, by which this is achieved. The book is important also from another point of view because, at least within the territory it covers, it has reached saturation-point in the presentation and teaching of the topographical details of the structure of the human body. It marks perhaps the end of an epoch characterised by the intense study of macroscopic anatomy. The demand for lopping something off the curriculum, which, as the barber said of his customer's ear, is too big anyhow, has now become peremptory and will probably have to be conceded. Hitherto anatomy has been the chief instrument by which the diffuse and wandering mind of the student, acquired through secondary school chaos, has been drilled and disciplined. It has played the part of Latin grammar in medical education. If other subjects can produce more of precise learning, clear thinking, loyalty to the scientific method, and everyday practical usefulness then some of the details included in the anatomy taught to students will find a place only in works of reference.

This book is a landmark of great learning, a most skilful presentation of a kind of anatomy that at the moment is in danger of being unduly neglected.

Précis d'anatomie pathologique

By Gustave Roussy, Professeur à la Faculté de Médecine de Paris, Membre de l'Académie de Médecine; Roger Leroux, Professeur agrégé à la Faculté de Médecine de Paris; and Charles Oberling, Professeur agrégé à la Faculté de Médecine de Paris. Paris: Masson et Cie. 1933. 2 vols. Pp. 636 and 637–1344. Fr.160.

This is a didactic work for the student and practitioner wishing to put himself in touch with recent advances in pathological anatomy. The fundamentals of the general morbid processes are first dealt with in three preliminary chapters, and then, abandoning the classical division into general and special pathology, the authors have described changes in different organs in illustration of the more general phenomena. As a result special pathology has not been fully treated; a selection has been made with a view to including only those lesions which are regarded as the most important and best demonstrate the general processes involved. The work being designed to supplement other expositions in the same series the special senses are omitted. A disadvantage of this arrangement is that the student obtains no clear conception of the way in which diseases such as hyperpiesia, diabetes, and infective endocarditis—to take three examples at random—affect the body as a whole. It is moreover not easy to use the book as a work of reference, particularly in respect of the neoplasms which are very incompletely indexed.

In many quarters, at any rate in this country, some of the teaching will be unacceptable. For example, in the section on blood-vessels we find that arterio-sclerosis is described as a form of chronic arteritis; further, pure hypertrophy is not included as a cause of arterio-sclerosis. No English pathologist will be pleased to learn that we still regard carcinoma of the lung as a sarcoma; there has been little doubt in this country concerning the true nature of these tumours since the publication of W. G. Barnard's paper in 1926. There are other respects in which the work is not up to date. It is time now that the description of status lymphaticus as a morbid state was abandoned, or at least qualified with a strong note of scepticism. Most people also have ceased to look for the cause of osteomalacia in dysfunction of the ovaries. In describing the pathogenesis of thrombosis the important work of the German school is completely ignored. In other parts, notably the sections dealing with the nervous system, the text is fully adequate. It is disconcerting, however, to find the acoustic neuroma described as a "peripheral glioma."

It remains to add that the work is well produced. The descriptions flow with that lucidity in which the French excel, and the illustrations (582 in black and white and 4 plates in colour) are admirably clear and copious enough to give these volumes value as an atlas.

Red Blood Cell Diameters

By Cecil Price-Jones, M.B. Lond. London: Humphrey Milford. Oxford University Press. 1933. Pp. 82. 10*s.* 6*d.*

Twenty-three years ago Dr. Price-Jones published a paper on the variations in the size of red cells. To-day the Price-Jones curve has become, if not a household word, at least a Conjoint question. The determination of red cell diameters by the accurate technique he has devised, not only plays an increasingly important part in the diagnosis of anæmias, but also has thrown much light on the more theoretical problems of hæmatology. The importunate searchers after knowledge who, by their persistent demand for reprints have persuaded Dr. Price-Jones to collect and arrange his published contributions on red cell size in book form, have therefore performed a public service. His history of the red corpuscle forms a fascinating introduction to the later chapters where the application of statistical methods are expounded. Apart altogether from its practical importance the book demonstrates the value of punctilious accuracy. None of the short cuts to red cell measurement, as halometer methods or hæmatocrit determinations, give any indication of the degree of variability; whereas this receives accurate mathematical expression in the Price-Jones technique. The absence of hypotheses and the number of facts compressed into small compass are grateful features of the book.

Swindon Victoria Hospital.—The annual report states that the income of this hospital in 1932 was £10,940, an increase of £1579, but higher expenditure reduced the advantage to £213. The hospital has 80 beds, and there is always a waiting-list which cannot be reduced without enlarging the buildings, and there is still an overdraft exceeding £4000.

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THE LANCET

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SCHIZOPHRENIA

It is seldom that one reads far in psychiatric writings without meeting some reference to schizophrenia.[1] The word, invented a little over 20 years ago, has almost ousted the Kraepelinian term "dementia præcox" for which it was at first a synonym and is still often thought to be a euphemism. The change in terminology was made necessary by the development of psychiatric opinion about this disorder. Evidence accumulated to show that it did not always issue in dementia nor begin during the second and third decades of life, as **Kraepelin** had said, though this was of course still seen to be true of a large number of cases. Its clinical course thus ceasing to be characteristic, its psychological structure was studied to find its essential nature, and possibly its causes and treatment. The term "schizophrenia" seemed to describe the outstanding feature of the mental disturbance, and contained no implications as to outcome; it had also some linguistic advantages which favoured its adoption. Since 1911, when **Bleuler** used the term in his great monograph, views have changed still further so that the term has not its original significance; the association psychology which he applied is no longer used to interpret morbid phenomena. But the changes have been greater than this. The old ideas about mental "disease," psychogenesis, and constitution have been modified or supplanted. New methods of research have been employed. The present knowledge about schizophrenia is enormous, but by no means fundamental. The best psychiatric opinion in all countries regards it as a provisional grouping, a congeries of biological types of morbid reaction; this grouping is the best at present because all suggested analyses of the clinical forms it includes have proved quite unsatisfactory. Many such attempts at analysis have been made, of which **Kleist**'s is the latest and most determined. It seems, however, that purely clinical methods of investigation will not avail to add materially to our understanding of this very widespread disorder; others have therefore been tried. The chief methods lately in use have been those of biology, whether physico-chemical, genetic, or constitutional, and of psychology. It is still difficult to collate the findings, and no responsible investigators claim finality for their conclusions. But the general view of psychiatrists is that schizophrenia covers several types of morbid reaction which are all largely determined by inherited constitutional factors of mind and body. These inherited tendencies do not always manifest themselves as schizophrenia; they may be latent or may appear in modified form as eccentricity or other anomaly of personality—the so-called schizoid character. But the constitutional factor, though prepotent, is not decisive. The experiences of individual life play a great part in provoking the outbreak of the disorder and affecting its course. Individual prophylaxis and treatment thus becomes possible, though in a large proportion of cases the constitutional influences appear to be far stronger than the environmental. Of all the aspects of schizophrenia, treatment is still the least known. It is more often efficacious than rational, and where many unlikely successes are attributed to some particular method of psychotherapy or physiotherapy, faulty diagnosis or uncritical zeal may be suspected. Fortunately, as Dr. H. R. C. **Rutherford** pointed out in opening a discussion at the section of psychological medicine of the B.M.A. in Dublin, much may be done in the way of prophylaxis and treatment even in the face of scanty precise knowledge.

Psychological study is sometimes boldly claimed to be the only mode of approach that promises curative treatment. The study of constitutional and hereditary factors is, however, more likely to offer grounds of eugenic prophylaxis and individual prognosis than psychological investigations to lead to effective specific therapy. This is not to belittle the valuable data collected by phenomenological, analytical, comparative, and pharmacological modes of research into the mental phenomena. The physical phenomena too have received much attention; in many cases it has been clear how artificial is the distinction here between mental and physical. The earlier search for anatomical changes in the brain has given place to metabolic, chemical, and other physiological investigations, such as those of **Golla** in this country, **Hoskins**[2] in America, and many more. Such studies are indispensable, though they often lead to a confusion between secondary changes and causes.

Schizophrenia is to-day the centre of psychiatric research. Material is being accumulated on all sides; comparative studies of catatonia, social, and statistical investigations are being carried out alongside the biological and psychological ones above referred to. But the framework is not complete. A unifying conception of great, and probably permanent, value has been provided by **Adolf Meyer**, but it may be doubted whether this now suffices to bring together all the details collected by diverse methods or to point the way to fuller knowledge. The separation of types or groups in which the genetic relationships and clinical or psychosomatic characteristics are fairly constant must be the preliminary to exact rational prognosis and treatment. Certainly sound prognosis and advice as to treatment in the individual case can now usually be given by the experienced psychiatrist, but those whose knowledge has been gained only in some limited field, such as psychotherapy or neurology, often fall into errors of diagnosis and prediction in this most difficult disorder, which have painful, even tragic, consequences. When fuller knowledge about schizophrenia or its components has become available, the complexity of the clinical problem will no doubt be less, and the possibility of such serious errors smaller.

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[1] Towards Mental Health: the Schizophrenic Problem. By Charles Macfie Campbell. Harvard University Press. 1933. Pp. 110.

[2] Hoskins, R. G., and Sleeper, F. H.: Organic Functions in Schizophrenia, Arch. Neurol. and Psychiat., July, 1933, p. 123.

THE MORE EXACT STUDY OF CLIMATE

It is not yet fully understood just how a change of air or removal to a warmer climate in winter is favourable for the arrest of many chronic ailments; why young catarrhal subjects in whom metabolism requires stimulation are benefited on the east coast of England, and elderly persons with failing powers do better in the climates of the west. On the whole, and in the long run it may be true that " 'tis the hard grey winter makes hard British men," and young people trained to endurance certainly may and do disregard the extremest influences of climate. But laboratory experiments on healthy subjects cannot prove the effect of a remedy in arterial hypertension, and in the same way the influence of climate, as of drugs, must be measured in like conditions of disease. So it is that the physician in the choice of surroundings and habitat for these weaklings at all periods of life is like the gardener finding the right exposure or shelter for delicate plants. Is it reasonable to suppose that whilst the life and well-being of all animal and vegetable organisms are conditioned by temperature and season and shelter, man alone is unaffected by such influences? Huntingdon, in his studies on Civilisation and Climate, asserts that both for physical and mental effort there are optimum temperatures, the physical optimum corresponding to the warmth of July in England and the mental to the moderate cold of the English January. The circle of the seasons brings a variety of stimuli. It has often been stated that human sensitiveness to physical surroundings, especially in conditions of ill-health, surpasses that of any instrument.

The influence of external cold in the development of disease has perhaps been too emphatically asserted and denied, according to the point of view of the observer. Some fresh light has been thrown on this problem by disregarding normal subjects and studying the behaviour of subnormal persons who appear to be more sensitive to external influences, and especially those who show tendencies to respiratory and other disease. De Rudder at Munich, following other climatologists, has studied[1] the abrupt and gross weather changes resulting from the movement of masses of air coming from high and low latitudes. These atmospheric masses appear to differ widely in many physical characters, such as temperature, permeability to radiant energy, and ionisation. De Rudder finds at Munich certain corresponding changes in the incidence of what he calls meteorotropic diseases and symptoms. These illnesses, according to his observations, are apt to occur in the "stenosis weather" of certain atmospheric disturbances—such as croup and convulsions in infants, puerperal eclampsia, rheumatic pains, coryza, thrombosis, apoplexy, hæmoptysis. In a recent discussion[2] at Amsterdam on chill in the causation of disease, Van Loghem gave the findings of simultaneous investigations by a group of observers in various parts of Holland, which appeared to show that coryza was related to temperature, the fall of temperature always increasing its incidence. He suggested that external cold caused disturbance of heat regulation, which could be observed even in healthy children with the fall of temperature at night. The same relation to climatic conditions in persons liable to certain types of illness, especially to the combination of cold moisture with wind, had been observed in 1917 by H. Schade. R. F. Fox held that a condition of "chronic chill" was widespread in northern latitudes and was a common precursor of disease. A vicious circle was set up by a continued loss of body heat, with diminished metabolism. The new custom of thin clothing and exposure of the unprotected body to the sun and air at the seaside and in pool baths offers good opportunity for precise study of the local and general effects of external cold, especially on superficial and deep body temperatures, and on the skin and circulation. It is said that the bare arm loses 30 per cent. more heat than the covered arm. The legs exposed to chill are apt to show dilatation of the capillaries and smaller veins, with contraction of the smaller arteries. This true spasm is a distinctive reaction to cold, and appears to be proportionate to the lowering of skin temperature. In a warm atmosphere it is only very slowly relaxed, whilst the dilatation in the capillaries and veins tends to persist. On the other hand, after exposure to sun-heat and erythema the dilated arteries may not recover their normal condition for weeks and months. Loss of vascular tone is one of the undesirable results of excessive sun-bathing. It is very different from the normal reaction or after-glow which follows a cold bath of wind or water. To the restoration of this desirable response, so often lost or insufficient in tired and chilly subjects, the warmth of sunshine in wind or water is a great contribution.

It would thus seem possible by careful studies of the reaction to external impressions, both in the summer and in the winter season, to adjust the exposure to sun and air, and the selection of climatic influences to differing individual requirements. This can only be done by observation of body heat and the behaviour of the vasomotor system, by noting the reaction of the respiratory mucosa and circulation to judicious changes of air with different degrees of daily range of temperature. The seaside airs will generally be found to favour abnormal circulatory and respiratory reactions by their purity, luminosity, equable temperature, and sedative humidity, especially in winter; above all by degrees of shelter and exposure to wind. For wind accentuates all the reactions induced by the open air, and especially increases the cooling or chilling effects of cold and damp. Wind may also be distressing to mind and body, like the Sirocco, or enervating like the Mistral; it may be a shrewd nipping air in the north or a warm vagrant wind from the sea or the moor.

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[1] Wetter und Jahreszeit als Krankheitsfaktoren. By Privatdozent Dr. B. de Rudder. Berlin: Julius Springer. 1931. S.137.

[2] THE LANCET, 1931, ii., 1243.

HYPERPARATHYROIDISM

HYPERPARATHYROIDISM is a conception less than eight years old, and there can be few maladies, old or new, whose mystery has been solved so speedily. A decade ago we had no proof of the relationship between parathyroid activity and the metabolism of phosphorus and calcium, and the advance of knowledge since that time shows medical research at its happiest. The coöperation of medicine, dietetics, experimental pathology, histology, physiology, and chemistry has directed the surgeon's knife towards a tumour he could neither see nor feel, and the number of recorded cases of generalised osteitis fibrosa which have been arrested or cured by operation is now at least 52. Three of them are described in our present issue.

In 1891, in a Festschrift in honour of VIRCHOW's 71st birthday, VON RECKLINGHAUSEN gave the first accurate account of the disease which now goes by his name. Although his contribution is involved and he described more than one bone disease, there can be no doubt that his Cases 5 and 7 constitute the discovery of generalised osteitis fibrosa. Thirteen years later ASKANAZY reported a case associated with a parathyroid tumour, but no special significance seems to have been attached to the association, despite the fact that ERDHEIM had already noted enlargement of the parathyroid glands in osteomalacia, and had suggested they were functionally related to calcification. When opinions differed on whether the increase in parathyroid secretion was primary or secondary to the bone disease, ERDHEIM himself defended the view that the skeletal change was primary and that the parathyroids enlarged merely to meet the greater demand for calcium. On this assumption F. MANDL, in 1925, transplanted four parathyroid bodies into the abdominal wall of a man with generalised osteitis fibrosa. No improvement followed, however, and he accordingly explored the neck, where he found a parathyroid tumour measuring 2·5 by 1·5 by 1·2 cm. This was removed, and the subsequent disappearance of pain in the bones, the reduction in excretion of calcium in the urine, and the general improvement in the patient's health constituted the first clinical evidence that in this disease the parathyroid lesion is primary and the skeletal changes secondary. By this time it was well established that the parathyroid glands are specifically concerned in regulating the metabolism of calcium. The isolation (by J. B. COLLIP in 1925) of an active parathyroid extract which raises the calcium of blood and urine, and the recognition (by D. HUNTER and J. C. AUB in 1926) that injection of this extract causes loss of calcium from the bones, were the next important steps in deciding that in generalised osteitis fibrosa the high calcium content of the serum, the increased calcium excretion in the urine, and the diminished density of X ray shadows of the bones point with certainty to a parathyroid lesion. The final proof was soon furnished by two independent groups of investigators. In 1930 JAFFE and BODANSKY were able to inject COLLIP's parathormone into puppies in increasing amounts over a long period without fatal results. "These injections led to progressive decalcification and resorption of the existing bone to, fibrous replacement of the marrow, and to the production of other features characteristic of osteitis fibrosa." In 1931 JOHNSON and WILDER not only confirmed these observations, but also demonstrated that the effects of prolonged administration of parathormone are not materially influenced by simultaneous administration of irradiated ergosterol—which indicates, of course, that the disease is not ætiologically related to the vitamin-D deficiency disorders such as osteomalacia and rickets. These experiments incidentally prove the correctness of H. M. TURNBULL's histological interpretation of the changes in the skeleton in man :—

> "The changes in the skeleton," he wrote in 1931, "are lacunar resorption, apposition, fibrosis of marrow, and the formation of osteoclastomata and cysts. Lacunar resorption is the predominant change. There is a general osteoporosis, which varies in degree in different places. Apposition, however, does not cease. Where present it is usually abnormally active, and most of the bone formed is non-lamellar. The exceptional rapidity of apposition explains the abnormal depth of many of the osteoid zones; there is no osteomalacia in the strict sense."

Hyperparathyroidism in man has the following features: pain and tenderness of bones, sometimes with spontaneous fracture; hypotonia and muscular weakness; anorexia, sometimes with nausea, vomiting, and abdominal cramps; polydipsia and polyuria; renal calculi, sometimes with colic and hæmaturia; wasting in advanced cases; high serum calcium; low plasma phosphorus; increased output of calcium in the urine; and evidence in radiograms of generalised decalcification of the skeleton, with or without deformities, cysts, and tumours. It is more than twice as common in women as in men, and it usually appears between the ages of 35 and 55. The youngest case known is in a girl of 13, and the oldest in a woman of 69. The serum calcium figures vary between 12·6 and 23·6 mg. per 100 c.cm., the plasma phosphorus between 1·0 and 2·7 mg.; the output of calcium in the urine varies from a slight increase to eight times the normal figure. Radiograms show a greatly diminished density of bone compared with a control subject of the same sex, age, weight, height, and build as the patient, and some authors consider that the picture of decalcification is pathognomonic of the disease, consisting as it does of a uniform, miliary, granular mottling, best observed in the calvaria, thinning of the corticalis and trabeculæ, and the presence of areas of subperiosteal resorption in the long bones and phalanges. In addition there may be radiological evidence of cysts, but these only rarely expand the corticalis. As for the tumour itself, it has been palpable in less than 20 per cent. of the 60 cases operated upon. Even the largest removed, which measured 7·5 by 5·0 by 1·8 cm., and weighed 26·2 g., could not be felt in the neck because it was behind the trachea. In at least 10 per cent. of cases the tumour has been removed from the mediastinum, and in eight cases two parathyroid tumours were removed, five of the patients surviving this drastic treatment, while the other three died in tetany. In three cases subtotal parathyroidectomy was performed, for the good reason that in each of them two normal parathyroid bodies had already been excised. In only two of the 60 recorded cases has death immediately followed operation, but in another six tetany or a renal complication killed the patient at periods varying from 19 days to 14 months later. Even if we allow that unsuccessful ventures do not always find their way into print, the operative mortality is not high. And this in spite of the fact that the technical problems confronting the surgeon may be complicated.

Thus in 1931 A. J. WALTON reported a case where search in the usual sites of the parathyroid bodies did not reveal a tumour, and a small mass in the lower part of the thyroid gland was removed in the belief that it might be a parathyroid tumour. However, on section this proved to be thyroid tissue, and since its removal was not attended by any material chemical changes in the blood, he opened the wound five days later. He then incised a deep layer of the cervical fascia which forms the bed of the thyroid gland, and two parathyroid tumours were found and removed. One tumour was lying behind the œsophagus, and a second larger retrosternal tumour was lying in front of the second and third thoracic vertebræ. Since learning of this experience others have realised that previous unsuccessful explorations have been incomplete. In one such case seven exploratory operations were performed in the course of six years, the tumour being found ultimately only by dividing the sternum.

Removal of a parathyroid tumour brings about dramatic changes. Usually, for some reason not yet clear, pain in the bones goes away immediately; in many cases polydipsia and polyuria are promptly abolished; often there is disappearance of gastro-intestinal symptoms, gain in weight and strength, and ability to resume work. Decrease in size of osteoclastic tumours of bone within a few weeks of operation on the neck has now been many times recorded, and as a rule the level of the serum calcium and plasma phosphorus and the excretion of calcium in the urine are restored to normal. Sometimes, indeed, there is temporary hypocalcæmia, and even oliguria. Latent tetany after operation has been very common and manifest tetany has often occurred, followed by death in four cases. I. SNAPPER has published a case in which tremor and acute mania came on three weeks after operation, at a time when the serum calcium had dropped to 6·6 mg. per 100 c.cm.; but the condition was completely relieved in three days by giving injections of the parathyroid hormone in conjunction with a preparation of calcium administered intravenously, and this must undoubtedly be regarded as the essential treatment of severe post-operative tetany after removal of a parathyroid tumour. The ordinary post-operative treatment should include a high calcium diet and ultra-violet irradiation. It is interesting to note that the symptomatic changes bear no relation to the size of the tumour: thus a woman of 37 (HUNTER and TURNBULL, 1931), after four years of total crippledom, including great bone deformities and destruction of hip-joints and shoulder-joints, had a tumour weighing only 1·3 g. removed, and is now able to walk with sticks and to sew and knit. Where, on the other hand, no tumour at all is discovered, removal of one or two normal parathyroid glands has had no permanent good effect. Such an operation does not in fact seem to be permissible, for in every case of hyperparathyroidism yet recorded there has been a tumour measuring at least 0·7 cm. in its greatest diameter. Moreover in the series of 60 cases operated on three deaths out of the eight have been due directly or indirectly to interference with one or more normal parathyroid bodies.

So much, and more, is known about hyperparathyroidism, and it seems to justify our statement at the outset that the mystery is solved. But this of course is less than half a truth. For if the skeletal changes are due to over-secretion from a parathyroid tumour, what then is the cause of the tumour? And if we cannot answer this question, how can we foretell the fate of the patients "cured," or say what will happen to the glands remaining to them? Long-continued and careful studies are needed before these matters become clear; but in the meantime something—very much—has been achieved. Even if we forget for the moment the accession of new knowledge, it is noteworthy that 52 people should be relieved of so much suffering which seemed beyond all remedy, and it is promising that one case at least should have been cured before bony deformities appeared (J. F. VENABLES, 1933). The terrible crippling caused by generalised osteitis fibrosa will soon be a thing of the past.

A REPORT ON THE FRIEDMANN VACCINE

A COMMISSION set up by the German Health Office to report on the value in veterinary practice of the Friedmann (turtle) vaccination against tuberculosis, has just reported (Reichsgesundheits Blatt, No 31, quoted in *Deut. Med. Woch.*, August 18th, p. 1299). The commission consisted of Prof. W. Zwick of Giessen, Prof. W. Ernst of Munich, and Prof. H. Dahmen of Berlin, all of them directors of veterinary institutes. Their conclusion is that the experiments carried out by Friedmann with his vaccine on three oxen bovines with one control cannot be regarded as proof of its protective or curative action. Material for forming an opinion has perforce been limited to the study of communications made to veterinary literature, as repeated negotiations with Friedmann and his co-workers have failed to induce them to make a scientifically controlled test.

ANNOTATIONS

TRIVIALITIES OF PANEL PRACTICE

A CONTRIBUTOR to *Punch* remarks that the amount of annoyance caused by noise depends not on its magnitude but on its preventability. The banging door brings insomnia more certainly than the thunderstorm, because one is always wondering whether to get up and shut it. The same applies to trials of panel practice such as those lately described in our column of Panel and Contract Practice. A fortnight ago "Candid Friend" protested against our giving publicity to trivial grievances which he thought gave a wrong impression of the conditions under which the Insurance Acts are worked. But it is in fact the details rather than the principles which worry the practitioner who has to carry out this scheme. Although he may dislike it, he has accepted the principle that he must give treatment to any insured person who demands it, and for a capitation fee which he may in his heart consider inadequate. He recognises that the State in guaranteeing him an income from people who might not otherwise pay has the right to call the tune. These things do not disturb him at night any more than the thunderstorm because he has accepted their inevitability, and there is nothing to be done about them except by concerted action over a prolonged period. The hardships for which we have given chapter and verse may be trivial—mere encounters at the cross-roads, as the word implies—but they take up his time and thought, just because there *is* something to be done about them. Take the case of a woman who comes up night after night for a certificate to which she is not entitled, although in the face of repeated explanation she is still convinced she is entitled because the agent has told her so. Like the door banging at night these annoyances can generally be put an end to by the exertion of effort, by making or answering complaints it may be before one or other of the statutory committees. Here, again, there is a difference of quality between the big noise and the little one, for whereas the panel doctor is willing to credit the Ministry of Health with honest endeavour to make the regulations fair, his experience is not quite the same with the administration of the Act by insurance committees on which medical representation is small. And yet it is supremely important for everyone concerned that those who are responsible for medical benefit should not be irked by petty details of procedure to the detriment of their proper work, which is curing sick minds and bodies. For this reason, and this reason only, we have given prominence, and shall continue to give prominence, to the occasions of these encounters at cross-roads in order that their cause and remedy may be discovered. To some extent they are the outcome of a new and alarming tendency for the sick person to be in search not so much of cure as of his rights. And if this tendency continues it may ultimately become necessary for the doctor to confine himself to his proper work of healing and appoint agents to do his certification.

PHOSPHATASE TEST FOR RICKETS

IN the research laboratory of the Infants Hospital, Dr. Jean Smith has succeeded[1] in estimating the average phosphatase content of the blood plasma in normal infants, and has shown this to be 0·248 units, with a range of 0·2 to 0·3 units. These units can be determined by means of a fairly simple technique. Without a standard of this kind it is impossible to recognise departures from the normal, or to appreciate their significance when found. Dr. Jean Smith has been able to show that in artificially fed infants the average phosphatase concentration is higher than normal—i.e., 0·52 units, with a range of 0·4 to 0·7 units, and that this figure can be brought down to normal by supplementary fat-soluble vitamins. In active rickets the phosphatase concentration of the plasma reaches the high average of 0·772 units, with a range of 0·41 to 1·29 units—in other words, it is about 300 per cent. above the normal. From these figures it is justifiable to infer that without the addition of fat-soluble vitamins ordinary artificial dietaries must be regarded as rachitic, and that infants fed on them will develop rickets, although there may be some interval before they manifest the disease clinically. This interval is apt to vary with the clinician, for many of the symptoms which are by some included in the rachitic syndrome are regarded by others as due to deficiencies or causes which have no connexion with the clinical picture of true rickets; this has in fact become something of a dumping ground for symptoms which at present cannot be assigned to their true causes. The discovery of the part which phosphatase plays in the pathogenesis of rickets may help to dispel the uncertainties which exist in the diagnosis of this disease in its early stages. The phosphatase test has demonstrated the delay between the commencement of rickets and the appearance of recognised clinical signs and symptoms. By the same means it should be possible to show that the healing process commences before there is any other clinical evidence to support the belief that a cure is in view.

ACTIVE PRINCIPLES OF DIGITALIS

ONE of the most valuable of drugs, digitalis has of late become even more useful through developments in methods of administration; also the indications for its employment are more numerous and better defined. But two serious drawbacks to the use of natural preparations are ignorance of their composition and their variable potency. Even when biological methods of standardisation are employed no account can be taken of, for example, varying rates of absorption of different glucosides from the alimentary canal, nor of variations in the time taken to eliminate them from the body. It is here that an important step forward has been made as regards digitalis, for we now have two glucosides in pure form, digoxin and digitalinum verum, and these have the advantage that they are of unvarying potency and need no biological standardisation. Dr. E. J. Wayne[1] has tested them by determining their capacity to reduce the ventricular rate in suitable patients with auricular fibrillation, and compares the results with those obtained with the well-established impure preparations of digitalis. Digoxin, a crystalline glucoside isolated from the leaves of *Digitalis lanata*, when injected intravenously in a weak alcoholic solution, was found to cause some ventricular slowing within five minutes, the full effect occurring after two hours. In doses of 0·75 to 1·0 mg. it will cause a maximum fall in rate of about 30 beats per minute, when the initial rate is 80–90, and with a rapid ventricle the reduction in rate is greater. The effect is not of long duration, and passes off completely in about 48 hours. Digoxin is also effective when given by mouth, and with doses of 1·0 to 2·0 mg. a fall in ventricular rate is seen within an hour, and a maximum effect in six to seven hours. After a single dose of 1·0 or 1·5 mg., the ventricle returns to its original rate in about three days. Six hours after the initial dose, further doses of 0·5 or 1·0 mg. may be given daily till a full therapeutic effect is obtained. A maintenance dose of 0·5 mg. was found to correspond to 2 c.cm. of standard digitalis tincture. These results suggest that digoxin is rapidly eliminated from the body. Nausea and vomiting are produced by all potent preparations of digitalis when given in sufficient quantity, probably by a reflex from the heart, and digoxin is neither more nor less liable to produce these effects than the tincture. Similarly both digoxin and the tincture seem equally liable to cause extrasystoles. The other glucoside, digitalinum verum, given intravenously in doses of 2·5 to 5·0 mg., produces its preliminary and maximum effects on the heart-rate in much the same time as digoxin, and their duration is also comparable. It is ineffective, however, by mouth, it does not lower the heart-rate, and it gives rise to abdominal discomfort and diarrhœa, the result of a direct action on the bowel.

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[1] Arch. Dis. Child., June, 1933.

[1] Clinical Science (embodying Heart), 1933, i., 63. This journal, as already announced, is edited by Sir Thomas Lewis, from University College Hospital Medical School.

To sum up, we have in digoxin a pure digitalis glucoside, requiring no standardisation, which is of uniform potency, and is capable of producing rapid ventricular slowing when given by mouth or intravenously to patients with auricular fibrillation. Digitalinum verum, another pure glucoside, has the same effects when administered intravenously, but is of no value when given by mouth.

TRAFFIC IN DANGEROUS DRUGS

THE convention for the limitation of the manufacture and distribution of dangerous drugs of 1931, having received the required number of ratifications, came into force on July 13th. If its object is to be achieved it will require to be universally applied, and its effectuation will depend upon the legislative and administrative measures adopted by the several contracting parties. To this end a model administrative code has been issued by the League of Nations in the hope that governments will have regard to it when giving effect to the convention. The completed returns for the year 1931 have led the advisory committee on traffic in opium to think that in that year the manufacture of narcotics approximated to the estimates of world requirements for medical consumption which were put forward by the League of Nations. There is, however, ground for believing that clandestine factories for the manufacture of morphine and heroin have sprung up in various parts of the world, and that poppy cultivation on a large scale is being carried on in several of the provinces of China. The exports from France in 1932 were reported to be 155 kg. of morphine, 22 kg. of heroin, and 55 kg. of cocaine. The representative of Germany informed the advisory committee that a supplementary law had been promulgated to restrict further the manufacture of narcotic drugs. The Portuguese delegate assured the committee that a new policy was contemplated in Macao with a view to suppress the traffic in prepared opium with which that port has long been associated. The Bangkok agreement, which dealt less drastically with the suppression of opium smoking than was provided for by the Hague Convention of 1912, has been ratified by Great Britain, France, and the Netherlands. At the request of the representative of Italy, the secretariat of the League has been instructed to make inquiry (1) as to the annual value of the lawful consumption of opium, coca leaves, and manufactured drugs, and (2) as to the annual loss of wages among addicts, and the expenditure incurred by the different States on preventive measures, treatment, and suppression in connexion with addiction.

In pursuance of the resolution passed by the assembly of the League two years ago with a view to limit cultivation of the the opium poppy and the harvesting of coca leaves, questionnaires are about to be forwarded to producing States, members of the League, and to non-member States. Replies to the questionnaires, when received, are to furnish the data for the conference on the limitation of raw materials which was desiderated by the assembly. The advisory committee has suggested a meeting of representatives of Persia, Turkey, and Yugoslavia, as principal producing countries, with one or two independent persons, in order to devise an agreement on the limitation of production. Presumably, representatives of China and India will be invited to assist in such investigation.

MATERIALS FOR RESTORING FRONT TEETH

THERE are three materials which can be used for filling front teeth—gold, porcelain, and a translucent cement. Gold is the most ancient of these, but it is not necessary to be very old to remember tedious hours spent in the dental chair while gold foil was hammered into a tooth piece by piece. The value of gold for this purpose depends on its property of welding in the pure state, the solid plug being very stable and undergoing little change even over many years. The drawback is that gold filling in a front tooth is easily observed, and when gold was the only material available people unfortunate enough to have carious front teeth were compelled to carry about visible signs of the dentist's attention. To-day gold is little used for filling front teeth, though in the form of the gold inlay, in which a reproduction of the cavity is cast and cemented in, it is still much used for back teeth. But while this method avoids hammering the prime defect of a filling completely unlike a tooth in colour remains. Yet at the annual meeting of the British Dental Association held in Leicester there were still advocates of cohesive gold for front teeth. Prof. W. H. Gilmour, who opened [1] a symposium on their restoration, stressed the great value of its strength and permanence. An increasing number of the public however dislike intensely the glitter of gold in the front of the mouth. The use of a porcelain inlay cemented into place was advocated by Mr. C. S. Morris. This is of considerable strength and is capable of matching a tooth almost exactly, but it requires an elaborate and expensive electric furnace, the technique is difficult and takes time, and restorations in porcelain are necessarily expensive. A serious defect is that the cement used to fix the inlay into place in time darkens and spoils the appearance. As an inlay porcelain is little used, though in the limited field of crowns it is the last word in refinement, for it can be employed without destroying the pulp and gives a restoration quite indistinguishable from natural teeth. Ground porcelain filling, in the manner devised by W. Dall, and advocated by Mr. S. F. Webb, is wrong in principle as it necessitates the removal of sound tissue in order to make the cavity fit the inlay. Silicate or translucent cement, advocated by Mr. G. N. Groves, is placed in the cavity in a plastic form which rapidly sets. It is not adhesive, a fault it shares with gold and porcelain, and its edge strength is poor compared with gold. It is translucent and can match the tooth exactly, but in time it tends to discolour. The filling may have an irritant effect on the pulp and if the latter is not protected it may die. Yet the ease with which it may be inserted, its cheapness as a material, and the fact that it does not need expensive apparatus like fused porcelain or take the inordinate time required by cohesive gold all mark it out as the material of choice. For practical purposes translucent cement has replaced all other methods except for unusual conditions. When the filling discolours it can be replaced without further sacrifice of tooth substance, and even the lack of edge strength can be overcome by the cunning use of a gold or stainless steel wire support much like reinforced concrete.

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[1] Brit. Dent. Jour., July 15th.

HYSTERIA IN DOGS

BY this time many dog-owners have become unpleasantly familiar with canine hysteria or "fright disease." Its principal characteristic is that the animal, previously healthy, gets fits of apparent terror, followed by more or less depression. These symptoms have been put down by some to encephalitis, but Mr. H. D. Walston's letter in *Nature* for August 12th (p. 243) suggests a different explanation. The evidence he has collected indicates, he says, that the disease is connected with vitamin-A deficiency, associated with ingestion of a substance present in dog biscuits and other cereals. Fifty-four dogs suffering from hysteria were studied, and it was found that all but one were receiving a diet in which cereals preponderated. Twenty-six of them were given the same diet and remained hysterical, whereas 28 were changed to a diet containing more vitamin A and thereupon recovered. It is recalled that E. Mellanby produced symptoms resembling canine hysteria by adding wheat germ to the diet of dogs which were getting too little vitamin A. It may also be recalled that as long ago as 1928 the treatment which was found most successful was the removal of all biscuit from the dietary.[1] At the same time Mr. Walston's work does not on the face of it explain why the disease was not observed until about ten years ago, and why it has increased so rapidly in both America and England.

TIRED LORRY-DRIVERS

THE relation of fatigue to accident needs no demonstration. What would be thought of railway companies if engine-drivers were encouraged or permitted to work for long periods without sufficient interval for sleep? Yet haulage contractors, it appears, employ lorry-drivers under conditions which make accident almost inevitable. Factory and workshop law makes great efforts to preserve the welfare and safety of employees. The overtired factory hand may injure himself; the overtired lorry-driver may cause the death of others beside himself. Section 19 of the Road Traffic Act was intended to regulate the working hours of drivers; either the section is not strong enough or it is not being properly enforced. At a Leicester inquest on August 14th a lorry-driver was found to have met his death by colliding with a tram standard. He had taken loads of potatoes from Boston to Rochdale on the Monday night, to Leeds on the Tuesday night, part way to Scarborough on the Wednesday night (when his lorry broke down), and he was on the way to Coventry when the fatal accident occurred early on Friday morning. His widow said the deceased had only 1½ hours' sleep in the period from Monday night to Friday morning; he had told her he was dead beat before he started on the Thursday night, and before he died he said "I must have dozed off." The haulage contractor who employed the driver told the coroner that he thought the man would get some rest between his journeys after delivering his loads. The coroner said it was slave-driving; the jury attributed the blame to the inhumanity of the employer, and the coroner agreed that the employer was morally responsible. At Bolton, a week later, there was a similar inquest on a lorry-driver who crashed into a tram standard. The man's mate gave the itinerary. He and the deceased left Oldham at 3.45 on a Sunday afternoon; they reached Edinburgh at 7 next morning, and Glasgow at 11. Leaving Glasgow at 1 P.M. on the Monday, they reached Lanark at 1.30 P.M., stayed there till 4.15, and then left for Carlisle. Carlisle was reached at 8 P.M.; they left an hour later and drove to Oldham. The drivers were paid by the journey, and the deceased was anxious to arrive at Oldham early in order to snatch a few hours' sleep before starting the same day for Bournemouth with a load. The employers fixed no time-limit for the journeys; the drivers had an incentive to make as many trips as possible in order to earn good wages. Traffic accidents are largely avoidable. Here is a class of accident which certainly can and ought to be avoided.

SUCCESS IN CATARACT EXTRACTION

FOR 20 years or more the choice between two methods has been before the ophthalmic surgeon who has to remove a cataract. In the intracapsular method—minor differences being associated with the names of Smith, Barraquer, and Sinclair—the lens is removed entire after rupture of the suspensory ligament. In the extracapsular method the capsule is first incised and subsequently dealt with if necessary by needling. The objection to the former is the possible risk of loss of vitreous, and the majority of ophthalmic surgeons in this country still pin their faith to the extracapsular method as now practised. In a recent article[1] Mr. Maurice H. Whiting shows how in skilled hands it has become one of the most successful operations in surgery, and enumerates the precautions necessary to ensure success. First, as a preliminary to operation, a bacteriological examination of the conjunctival sac should invariably be made. In the old days at Moorfields the test of bacteriological cleanliness was to place a pad and bandage over the eye the night before operation; the pad was removed in the morning, and if any discharge was found on it, or if the lids were stuck together, operation was postponed. Now the practice is to swab the conjunctival sac 48 hours previous to operation, and to smear the secretion so obtained over the surface of a blood agar slope. The detection after 48 hours' incubation of any organisms other than the *Staphylococcus albus* or the xerosis bacillus is a bar to immediate operation. With this precaution the risk of suppuration has been eliminated. Previous to its adoption the proportion of suppurations at Moorfields was between 1 and 2 per cent. The second point in pre-operative care is appropriate treatment when cataract is associated with diabetes. During or after operation the great danger to be guarded against is the patient's squeezing out vitreous. Careful management of the speculum is always necessary, but in addition to that it is found in many cases advisable to paralyse the orbicularis by injections of novocain, either from a point opposite the outer angle of the orbit, or, as the œdema of the lids so produced may be inconvenient, an injection round the upper branches of the facial nerve just below the temporo-maxillary joint. It is usually wise to insert a suture through the skin of the upper eyelid so that it may be pulled down over the eye after the operation.

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[1] THE LANCET, 1928, i., 249.

[1] Irish Journal of Medical Science, March, 1933.

As far as the operation itself is concerned, the incision and the fashioning of the conjunctival flap are done as they were 20 years ago. The methods of leaving a conjunctival bridge and of suturing the conjunctival flap, though practised by some surgeons, are rejected by Mr. Whiting as being unduly hampering. The new points that he stresses are the question of iridectomy and the method of capsulotomy by a secondary operation. The object of iridectomy is to prevent a prolapse, and it should be performed in any case where the pupil, after the extraction of the lens, shows a reluctance to resume its round shape. Iridectomy should not be performed before the delivery of the lens, as this favours the subsequent entanglement of the capsule in the coloboma, a common cause of post-operative inflammation. A peripheral button-hole iridectomy, barely noticeable afterwards, and leaving a round pupil, is the method of choice. Before the iridectomy and after the delivery of the lens, if soft matter is left behind, most of it can be got rid of by careful lavage with normal salt solution. The chief advantage claimed by the advocates of intracapsular extraction is that it does away with the necessity of a subsequent needling of the posterior capsule, but this is minimised by Mr. Whiting on condition that the needling is properly performed. In former times it was common for the surgeon to pass the needle through the capsule to a depth of several millimetres, thus ploughing up the vitreous and pulling on the ciliary body. If the point is introduced only just beneath the capsule to be divided these dangers are avoided, and it is the rarest possible occurrence for any serious results to follow.

"DAMAGED LIVES"

THE film with this title now being shown at the Coliseum is intended to impress the public with the dangers of venereal diseases and the need for treating them effectively. One of the difficulties about propaganda of this or any other kind is that it is useless unless it has an audience. There would be no point in making a good and dignified film about venereal disease if no one would come to see it, and rather than fall into this error the authors of "Damaged Lives" have made a film with features which can usually be relied on to bring people together.

Produced in Canada under the auspices of the Canadian Social Hygiene Council, it tells the story of a youth who returns from a year's holiday to take over his father's vast shipping interests. His fiancée refuses to marry him at once on the grounds that he has not yet "settled down." He dines at a night-club with a business friend and goes on a round of speakeasies with the friend's mistress, finally spending the night with her at her flat. This makes him revoke at bridge the following evening, whereby his fiancée at once realises that he has been unfaithful to her: so they get into a car and are married at 1.0 A.M. by a comic "justice of the peace." Some weeks later he is rung up by his friend's mistress in a state of agitation, and in a scene, presumably either of "simple beauty" or "poignant sincerity," prolonged until the audience wishes someone would knock their heads together, she tries to tell him that she has got "a disease." Before he can leave his flat she shoots herself. To protect his wife the young man tells her that he no longer loves her and goes out "into the night." He has sufficient sense left to go to a doctor, but unfortunately he chooses a quack who tells him there is nothing wrong and charges him $100. He returns home, is reconciled, and some time later is pleased to find that he is "going to become a father." But things go wrong, the wife is found to be infected and the husband is taken to a specialist's clinic by the family doctor where he is conducted round in order "to see what he is up against." He is shown cases of locomotor ataxia, gummata, syphilides, and finally, his own wife in a state resembling dementia præcox with her hat over one eye. At this point he nearly, and she quite, faints; and several members of the audience wisely leave. The young couple are reassured by the specialist, but go home and think about syphilis to slow music until he falls asleep on the sofa and she turns the gas on. Fortunately, he wakes in time to turn off the gas and the film ends on its one true and wholesome note—their mutual laughter at a foolish friend who rings up in a state of despair because she is going to have a baby but has temporarily forgotten it and has eaten pickles.

Exhibited with the approval of the British Social Hygiene Council, the film is followed by a lecture with moving diagrams by a Canadian venereologist, introduced by Sir Basil Blackett. This deals with the pathology of gonorrhœa and syphilis, and shows the normal processes of fertilisation and gestation. Though better than the story the lecture is too hurried and technical; and in both of them the mistake is made of emphasising the fact that syphilis can be transmitted by a kiss. Infection by this means is possible but unusual, and, unless corrected, the suggestion that it is common will cause unnecessary mental suffering to thousands—as we pointed out five years ago in reviewing a similar film.[1] In general, it must be a matter of opinion whether the effect of a picture like "Damaged Lives" is good or bad. But this particular venture certainly does nothing to help the medical profession to remove the fog of hush-hush emotionalism which envelops the subject of venereal disease, and we hope that before any other film on these lines is produced some clear thinking will be done on what exactly the public needs to be taught about these infections.

Dr. J. O. Wakelin Barratt has been elected Master of the Society of Apothecaries of London in succession to Dr. Cecil Wall.

Sir PHILIP MAGNUS, who died on Tuesday at his home in Surrey in his 91st year, was one of the principal factors in the advancement of technical education 50 years ago. For nearly ten years he was organising director and secretary of the City and Guilds of London Institute, and for nearly 30 years superintendent of the Institute's department of technology. Along with Sir Henry Roscoe he sat on the Royal Commission on Technical Instruction 1881–84, which led to the Technical Instruction Act of 1889 and the successful attempt to recover the lost ground in educational facilities for the promotion of industry. From 1906 to 1922 Magnus was Member of Parliament for the University of London and was closely associated with the medical men in Parliament whose committees he attended. His sympathies indeed were identified with professional matters and he was a good friend to medicine.

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[1] THE LANCET, 1928, i., 247.

SPECIAL ARTICLES

THE TRYPANOSOMES OF MAN
THEIR RESISTANCE TO ARSENICAL DRUGS

BY H. LYNDHURST DUKE, O.B.E., M.D.,
SC.D. CAMB.

DIRECTOR OF THE HUMAN TRYPANOSOMIASIS RESEARCH INSTITUTE, ENTEBBE, UGANDA

IN the *British Medical Journal* for Feb. 4th there appeared an arresting paper by Yorke, Murgatroyd, and Hawking, of the Liverpool School of Tropical Medicine, in which are presented the culminating experiments of a series of investigations into drug resistance in trypanosomiasis. Their report contains an account of previous work bearing on this subject and the misconceptions that have obscured it, and concludes with a description of the preparation of a strain of *Trypanosoma brucei* highly resistant to tryparsamide and the subsequent survival in its full intensity of the resistance of this strain after passage through *Glossina morsitans.* The work is interesting for a number of reasons, not the least among them being the successful employment for the first time, in a European laboratory, of tsetse derived from pupæ collected in Africa and sent to England by air. The authors claim to have produced "unequivocal evidence that the acquired character of 'arsenic resistance' in trypanosomes is transmitted unimpaired through the biological cycle of the parasite in Glossina, its natural invertebrate host."

This subject has been for some time past under examination both in Nigeria and in Uganda. In the annual report of the Tsetse Investigation Department, Nigeria, for the year 1931, there is a brief account of work carried out along this line. The report reads :—

> "A strain which was originally very sensitive to tryparsamide was made arsenic-fast by giving repeated small doses. It was not possible to discover whether this acquired characteristic could be transmitted through the fly as all attempts at transmission failed, probably because the strain had become practically non-transmissible during the necessary manipulation."

Mention is made, also, of a strain "found to be tryparsamide-resistant after passage through *G. morsitans*, though in this case it is probable that the arsenic resistance is a natural as opposed to an acquired characteristic." There is also a reference in a West Coast report to the preparation and transmission of a strain resistant to human serum, but no details are yet available in Uganda about the result of this last experiment. For some years past at the Human Trypanosomiasis Institute in Uganda my colleague, Dr. J. M. Wallace, has been studying the production of acquired resistance to drugs in the mild *T. gambiense* strains characteristic of human trypanosomiasis in Uganda, with the ultimate object of determining whether acquired resistance withstands cyclical transmission of the strain through tsetse. His results on the whole have been both puzzling and disappointing.

During the session of the League of Nations Commission in Uganda I carried out some experiments on this subject, aided at the commencement by Prof. F. K. Kleine. This work and the earlier experiments which Reichenow and Regendanz carried out with *T. lewisi* and the flea is reviewed by the Liverpool authors. The conclusion reached in both these investigations was that as far as could be determined no diminution of resistance occurred on passage of the strain through the insect intermediary. Yorke points out that the German workers failed to induce any substantial increase in resistance in their strain of *T. lewisi* over that possessed by the normal strain—a fact which they themselves realised and freely admitted. My own experiments are then discussed and criticisms are made, based on certain assumptions, which it is the purpose of this article to challenge. The point is important, because if Yorke and his collaborators are correct in their interpretation of the evidence before them, their claim at the end of their report is amply justified. But there is an alternative explanation which I propose to examine here.

The criticism of my work reads as follows :—

> "In the first place, there is no evidence that the resistance of the strain to atoxyl had actually been increased before the tsetse were infected with it. In the second place, the strain was very sensitive to atoxyl after it had been passed through Glossina—in fact, since such small doses as 0·02 g. and 0·025 g. per kilo of atoxyl cleared the blood of monkeys infected with the fly-transmitted strain, it would seem clear that the trypanosome was scarcely, if any, more resistant to atoxyl than it had been at the time of its isolation from the antelope."

It is plain that these comments are based on the belief that any disappearance of trypanosomes from the peripheral blood of the monkeys used in these experiments, following on the administration of a dose of arsenic, is due directly to the destructive action of the drug on the parasites; any such disappearance, taking place within four days or so of the inoculation of the trypanocide, is regarded as a manifestation of the sensitiveness of the strain as a whole to the drug.

Now an inspection of the protocols of the monkeys used in these experiments reveals the fact that trypanosomes sometimes disappeared from the monkeys' peripheral blood without any treatment. The course pursued in a monkey by an infection due to the Damba trypanosome is very different from that of either *T. brucei* or *T. rhodesiense* in mice. The larger and more resistant host without doubt plays a very much more important part in the struggle, even in an infection with *T. rhodesiense*, and with the species of trypanosome used in my experiments an untreated infection in monkeys sometimes lasted as long as 16–19 weeks. I do not believe, therefore, that the disappearance of trypanosomes from the peripheral blood of a monkey or a guinea-pig for a few days after the inoculation of an arsenical drug possesses the significance that Yorke and his colleagues attach to it. A strain may possess considerable resistance to the drug and yet disappear temporarily after an injection, owing to the predominance of sensitive forms in the peripheral blood at the time of the injection. If, however, instead of a temporary disappearance of parasites from the peripheral blood we adopt as our criterion of sensitiveness the complete and final expulsion of the trypanosome from the blood stream, we are on firmer ground. According to this standard my experiments appeared to show that at the beginning of treatment an initial dose of 0·02–0·025 g. per kg. body-weight sterilised several monkeys for at least six months, after which examination was discontinued. By subjecting the strain to small but increasing doses of atoxyl it became resistant to this dose, and still resisted it after transmission through *G. palpalis*, up to the third generation. That these experiments were not regarded as conclusive is, however, made quite clear in the text of the report.

So much for this first attempt to transmit acquired resistance through tsetse. The real object of this retrospect is to call attention to the fundamental difference between Yorke's and my interpretation of the same set of experiments. To the one they suggest that the strain was equally sensitive before and after treatment, because after the majority of the inoculations of atoxyl there was a temporary disappearance of trypanosomes from the peripheral blood; to the other, the failure of the dose used in the control experiments permanently to sterilise the monkeys' blood raised the suspicion that the original estimate of the sensitiveness of the strain was too high. Sensitiveness, as well as resistance, is a relative term.

DIFFERENT SENSITIVITY OF DIFFERENT STRAINS

This difference of opinion leads on to the practical bearing of the discussion. From the standpoint of the clinician confronted by native populations affected with trypanosomiasis, normal *T. rhodesiense* is resistant and normal *T. gambiense* is sensitive to therapeutic doses of approved arsenical drugs. No one nowadays would dream of treating an uncomplicated case of *T. rhodesiense* infection in man with arsenicals alone. *T. gambiense*, on the other hand, as a general rule responds readily to arsenic both in man and in animals. Human patients can readily be cured in the early stages of the disease, and unless the central nervous system is seriously involved tryparsamide can be relied upon to cure the sufferer.

In Chesterman's[1] long series of cases the doses efficacious in *T. gambiense* first-stage infections in man were 0·07 g. per kg. in children, 0·05 g. per kg. in young persons, and 0·045 g. per kg. in adults, given in eight weekly injections. Second-stage infections required slightly larger doses. He estimates that the maximum dose for adults is 4 g.

Chesterman did not confirm by sub-inoculation the identity of the strains infecting his cases, but had no reason to suppose he was dealing with any other than a strain of *T. gambiense* of average and normal virulence. All his first-stage cases were readily cured by tryparsamide alone. Chesterman found that atoxyl- or soamin-resistant cases could be cured by tryparsamide, but that a case which resisted tryparsamide could never be cured by further dosage with that drug. He remarks, also, that the first four doses of tryparsamide are probably the all-important ones. It is significant to the present discussion that he remarks: "It would, however, be of very great interest to know whether any morphological differences could be detected by animal inoculation of these strains which have become tryparsamide resistant, a distressingly large proportion of which we have to report."

At the Entebbe Institute we have for some years regarded the response to arsenic as a useful accessory test in helping to differentiate the two human trypanosomes from one another. More recently the Nigeria workers have studied the point. In his report of the Tsetse Investigation Department for 1930, Lester states that a human strain isolated in West Africa, when examined at Liverpool, was found to possess many of the characters of *T. rhodesiense*. The Nigeria annual report for 1931 contains the following observations: "It seems to us to be very significant that three out of ten strains tested show a natural resistance to tryparsamide in small laboratory animals." And lastly, Yorke, in the discussion following Chesterman's paper on the treatment of sleeping sickness by tryparsamide, stated that he had recently examined strains of freshly isolated human trypanosomes sent over to Liverpool in guinea-pigs from the West Coast, and was surprised to find tha some of these strains were but *slightly susceptible t* arsenic.

The report of the Nigerian investigators reveal the interesting fact that some human strains possess in addition to a natural resistance to arseni considerably greater than that of normal *T. gambiense* other qualities ordinarily associated with typica *T. rhodesiense.* The incidence in some of their infecte areas of more than one species of tsetse, and th extensive distribution of *G. morsitans* add greatly t the complexity and also to the interest of the situatio in Nigeria.

An uncomplicated early infection with *T. rhodesiens* in man or in animals will resist a dose of arsenic tha will cure an uncomplicated early infection wit *T. gambiense.* These naturally resistant West Coas strains, be they *T. gambiense* or *T. rhodesiense*, wil not yield to treatment with therapeutic doses o arsenic in man. The so-called sensitiveness o *T. rhodesiense* to arsenicals only becomes manifes when quantities of the drug are employed which ar fantastic when translated into their equivalent pe kg. body-weight in man. In a report published i 1930 some observations by Wallace are given on the action of atoxyl on *T. rhodesiense* and *T. gambiense.* Wallace found that some of his guinea-pigs infected with *T. gambiense* were sterilised by a single dose o atoxyl as low as 0·01 g. per kg. body-weight, and none ever relapsed after 0·03 g. per kg.[2] The trypanosomes disappeared from the peripheral blood within 24 hours in every animal, including those which subsequently relapsed. In guinea-pigs infected with *T. rhodesiense*, on the other hand, doses of 0·03 g. per kg. were given without causing any disappearance of the trypanosomes. and relapse occurred after 0·07 g. per kg. body-weight.

These conclusions require some modification in the light of the experience of the last few years. They were based upon experiments with a limited number of animals and strains. Also it is highly probable that importance attaches to the age of the infection in the guinea-pig at the time of the administration of the drug, and that the test dose should be given within the first week or two after infection of the pig. At the present stage of Wallace's investigations it appears that in guinea-pigs infected with *T. rhodesiense, T. brucei*, or *T. gambiense* an initial dose of 0·03 g. per kg. atoxyl is the critical dose. If trypanosomes fail to disappear from the peripheral blood for at least a week after the administration of this dose to a guinea-pig during the first two or three weeks of its infection, suspicion at once arises that the strain is not normal *T. gambiense*, but either *T. rhodesiense, T. brucei*, or a *T. gambiense* possessed of an abnormal resistance to arsenic. A serious obstacle to working with freshly isolated Uganda strains of *T. gambiense* is the extreme difficulty of infecting small laboratory rodents. Even when they become infected, trypanosomes are rarely seen in the peripheral blood, and it is necessary to pass the strain from animal to animal for a number of generations before commencing operations. The guinea-pig is more suitable than either rats or mice, the latter animals being extremely insensitive. With the strains of *T. gambiense* studied by the League of Nations Commission, Lavier found the same difficulty in infecting white rats. These difficulties, and the fact established by Yorke and his collaborators that the dosage of the arsenicals varies with the species of host, illustrate the complexity of the investigation and the need for extreme caution in arriving at conclusions.

Yorke gives 0·05 g. per kg. body-weight as the minimum effective dose of tryparsamide in guinea-pigs infected with the *T. brucei* with which he carried out his latest experiment, the standard of estimation being the disappearance of trypanosomes from the blood for an unspecified period. Actually, in the course of the preparation of his resistant *T. brucei* before transmitting it through Glossina, Yorke started by giving the guinea-pig a dose of 0·125 g. tryparsamide per kg., after which trypanosomes disappeared for seven days, and then reappeared in the peripheral blood. This dose in terms of a 10-stone man is equivalent to 7·9 g. Evidently then, *T. rhodesiense* (and *T. brucei*) possess a natural resistance to arsenicals very much greater than that of normal *T. gambiense*—speaking always of strains recently isolated from their host in nature. By treating *T. rhodesiense* or *T. brucei* with small and increasing doses of arsenic a high degree of resistance will develop, and this resistance has been found by Yorke and his colleagues to persist when the strain is passed through Glossina.

REASONS FOR RELAPSE AFTER ARSENIC

Now the practical incentive to research into drug resistance is surely nothing to do with *T. rhodesiense*, a trypanosome already sufficiently amenable to Bayer 205 and similar drugs, against which no naturally resistant strain has yet been detected. The expression "drug-fastness" used in connexion with human trypanosomiasis means to the medical man the fastness or resistance occasionally exhibited by *T. gambiense* against the drugs that normally destroy it. Particularly is the matter of importance in areas like the French Congo where human trypanosomiasis is controlled by wholesale and often temporary sterilisation of the peripheral blood of infected persons by occasional doses of atoxyl or some other arsenical drug. Obviously it is important to know whether there is a danger of inducing arsenic-fastness by such treatment, and whether a strain made resistant in this manner will retain the property when passed through fly. As we have seen, all strains of *T. rhodesiense* hitherto tested are for all practical purposes resistant to the arsenicals used in the treatment of human trypanosomes, in dosage tolerated by man.

When, in a region where *T. rhodesiense* is not known or likely to occur, a case of human trypanosomiasis is met with in which arsenic fails to sterilise the blood, there is a tendency to ascribe the drug-fastness to the effects of inadequate dosage, either in the patient himself or in some previous human host. Yorke has on more than one occasion called attention to the fallaciousness of this assumption. He points out that the persistence of trypanosomes after a course of tryparsamide may be due to the existence of foci of infection in the body inaccessible to the drug. Chesterman, also supposing the existence of such foci, holds that they are not completely impenetrable but that the drug reaches the parasites in such diluted strength that they acquire resistance. But other explanations are equally probable.

A native case of trypanosomiasis relapses after a full course of arsenic: what are the possible explanations of the continued presence of trypanosomes in the patient's blood? First, he may have been reinfected. This cause can be ruled out at once in some cases. Secondly, his system may have been unable to cope with the drug owing to some temporary or constitutional disability. Thirdly, he may be infected with a strain possessing an abnormally high natural resistance to arsenic. And finally, if his trypanosomes have indeed acquired increased resistance by contact with the drug, there is always a probability that the strain was originally possessed of an abnormal natural resistance. Regarding the second possibility, Yorke and his colleagues are reluctant to allow the species of host animal any action in determining the degree to which a strain of trypanosomes resists a drug. They rightly point out that a strain resistant in one species of animal will be found to be resistant in another. They have also shown conclusively by experiment in vitro that resistance is a property inherent in the trypanosomes themselves. But because a strain will resist large quantities of an arsenical in vitro it does not necessarily follow that it will manifest that resistance equally when trammelled by the reactions of a host animal capable, even when unaided by a drug, of exerting a restraining effect on the trypanosomes' activities. It is remarkable to note in the Liverpool reports what enormous differences there are in the response of one and the same strain to arsenic in different species of animals.

Take for example the *T. brucei* with which the transmission experiment through *G. morsitans* was performed.

	Normal strain. g. per kg.		Resistant strain. g. per kg.
In guinea-pig M.E.D. ..	0·05	......	0·5
In mice	0·4	......	2·25

So that the M.E.D.[*] of the normal strain in mice very nearly equals the maximum dose tolerated by the resistant strain (and, incidentally, by the host animal itself) in guinea-pigs.

AN ARSENIC-FAST STRAIN OF TRYPANOSOMES

We come now to the third possible explanation. Some four years ago I requested the medical authorities in Uganda to collect and send to the Institute at Entebbe any cases that had resisted treatment with tryparsamide in the West Nile area in Uganda. At the time it was hoped, by starting with a strain of *T. gambiense* already partly resistant to arsenic, that it might be easier to develop a high degree of resistance in the course of treatment at the laboratory. Three such cases arrived at Entebbe. All three patients received two or three doses of 1 or 2 g. of tryparsamide after their arrival at the Institute, without apparent effect on the trypanosomes in their blood. On arrival their trypanosomes were isolated in monkeys and carefully studied. One of the three strains proved to be unequivocal *T. rhodesiense*—the first example of this organism recorded from Uganda.[2] The second and third strains, numbered XXXVII. and XXXIX. in the laboratory series, were *T. gambiense*, and with these strains it proved difficult to infect guinea-pigs. With one strain four pigs were inoculated, and all failed to take on the first occasion, a second inoculation being successful. With the other strain, 8 out of 13 first inoculations failed in pigs. Both these strains proved slightly more resistant to arsenic than those previously examined. In most of the guinea-pigs treated with atoxyl the infection was well advanced when treatment began, having lasted six or eight weeks. It was found that 0·03 g. per kg. with strain XXXVII. expelled trypanosomes from the peripheral blood for several weeks, after which time they reappeared very irregularly. The animals lived from 159 to 217 days. With strain XXXIX., 0·03 g. per kg. generally caused the disappearance of trypanosomes from the peripheral blood for several weeks in guinea-pigs. Two monkeys, on the other hand, were apparently cured with a single dose of 0·03 g. per kg. Strain XXXVII. proved non-transmissible by *G. palpalis*: 1050 clean laboratory-bred tsetse were fed upon animals carrying this strain and only one fly, dying on the ninth day after its feed on the infected monkey, contained flagellates. Strain XXXIX. was readily transmissible by *G. palpalis*. There was no apparent difference between the behaviour of this strain to arsenic before and after passage through the tsetse. The two patients infected with strains XXXVII. and XXXIX. each received a dose or two of Bayer, which promptly sterilised the peripheral blood; they then resumed their course of tryparsamide, making an uninterrupted recovery.

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[*] M.E.D. = "The minimum dose which sufficed to clear the blood of at least 80 per cent. of the treated mice."

It may be noted in passing that Lavier and Van Hoof experienced the same difficulty in isolating strains of *T. gambiense* from the north-eastern Congo. During their visit to the Semliki Valley, while working for the League of Nations Commission, trypanosome-containing blood was inoculated from some 16 different patients, each patient's blood into a different guinea-pig, and only one became infected.

The comprehensive review of previous work on drug resistance given in one of Yorke's papers[3] shows that the early work of Mesnil and Brimont and Breinl and Nierenstein was done with *T. evansi* and *T. brucei*. The Liverpool investigators employed *T. rhodesiense* and *T. brucei*. Against none of these species is arsenic the normal therapeutic agent employed; they all possess a natural resistance to this drug in contrast to ordinary *T. gambiense*. The only available records of attempts to make recently isolated *T. gambiense* resistant to drugs are the work of the Nigerian investigators, and a mass of unpublished data accumulated during the last few years by Wallace at Entebbe. Both Wallace and Taylor succeeded—the former with considerable difficulty—in preparing a drug-fast strain of *T. gambiense*. Wallace's strain after prolonged persuasion reached a point where in many guinea-pigs it resisted a dose of 0·04 g. per kg., and in some of these subsequently relapsed after doses of 0·05 and 0·06 g.; in others the strain relapsed after initial doses of 0·05 and 0·06 g. per kg. In one pig after an initial dose of 0·06 g. per kg., trypanosomes persisted in the peripheral blood for 11 days, the animal dying on the fifteenth day without further examination or treatment. This pig was inoculated from a monkey which had been inoculated from a pig that had relapsed after an initial dose of 0·06 g., showing that the resistance, such as it is, was not affected by passage through an animal of another species. Both observers, however, encountered the same obstacle to completing their investigation—namely, the loss by the drug-fast strain of the power to develop cyclically in its normal intermediate host, the tsetse.

Yorke has indicated how a highly drug-fast strain of *T. rhodesiense* may develop by selection of resistant individuals, although on the whole he favours mutation as the more probable cause. We know that normal *T. gambiense* is susceptible to quantities of arsenicals well within the dosage tolerated by man. The reports from Nigeria suggest that in nature there are strains of *T. gambiense* that in their natural resistance to arsenicals approach very nearly their two more robust relatives. Such a strain we may imagine will possess a sprinkling throughout its constitution of individuals of abnormally high resistance. A patient infected with a strain of this kind would require treatment with Bayer; he would be poisoned by the quantity of tryparsamide required to destroy his trypanosomes. On isolation his trypanosomes would be found to resist relatively large doses of arsenic in laboratory animals, although in other respects behaving like an ordinary *T. gambiense*. The drug resistance of such a strain would survive passage through tsetse, because it is part and parcel of the constitution of the strain. The resistance would, moreover, in all probability be susceptible of considerable augmentation by frequent exposure to suitable quantities of the drug.

It is not unlikely that at any rate the majority of so-called drug-fast strains of *T. gambiense* in man in Africa are merely strains possessed of an exceptional natural resistance to arsenic; and such strains will no doubt retain their resistance when passed through tsetse, for the same reason that *T. rhodesiense* and *T. brucei* retain their yet greater natural power of resisting the drug throughout all the vicissitudes of their normal existence. We certainly need more information about the occurrence and reactions of arsenic-fast strains of *T. gambiense* in nature.

It appears to me that, interesting and valuable as is undoubtedly the work of Yorke and his colleagues, the main problem, as it confronts the medical officer in the field, is not yet solved. We still want to know whether a normal sensitive *T. gambiense* can easily become or be made drug-resistant to anything like the same degree as *T. rhodesiense* or *T. brucei*. Wallace's experience, and it is extensive, goes to show that it is a very slow and laborious process to make the mild Uganda strains of *T. gambiense*, freshly isolated from man, permanently resistant to arsenic. He secured a number of encouraging results in single guinea-pigs by prolonged treatment; but time and again, on passage into another guinea-pig, the increased resistance disappeared. If a large-scale atoxylisation of a native population is to produce the untoward result of disseminating drug-fast strains, it follows, surely, that *T. gambiense* must be as quick in the uptake of increased resistance as is *T. rhodesiense*. In the present state of our knowledge such an assumption seems to be unwarranted. And even if resistance can be acquired, we have still to learn whether, in the process of acquisition, transmissibility by tsetse is not seriously impaired or lost.

When Wallace commenced his work on drug resistance it was fully appreciated that both *T. rhodesiense* and *T. brucei* possessed great advantages over *T. gambiense* in an investigation of this kind. At the time I held—and I confess I still hold—the view that for all practical purposes *T. rhodesiense* and *T. brucei* are resistant to arsenic. It was therefore decided to proceed with *T. gambiense*, the actual villain of the piece, in spite of its obvious disadvantages. In rats our strains proved hopelessly innocuous; mice were not available at the time, and in any case would probably have been equally unsuitable. The choice of host was thus reduced to monkeys and guinea-pigs, and fell on the latter. Anyone familiar with the behaviour of mild *T. gambiense* in guinea-pigs will appreciate the nature of the task. At last, when from these experiments there emerged a strain steadily resisting 0·06 g. per kg., it was found that the trypanosome was no longer transmissible by tsetse.

The effect on *T. gambiense* of prolonged contact with a strongly reacting host, such as a monkey or guinea-pig, is not fully understood. There are, however, certain indications that the power of passage through tsetse is a relatively unstable character, and the fact that both in Uganda and in Nigeria a course of treatment of *T. gambiense* with arsenic has terminated in loss of transmissibility, at least suggests the need of further study along these lines.

In the final section of their paper the Liverpool authors make it quite clear that they regard their conclusions, derived from the study of *T. rhodesiense*, *T. brucei*, and *G. morsitans*, as directly applicable to the sphere of *T. gambiense* and its normal vectors *G. palpalis* and *G. tachinoides*. They refer, in fact, to the atoxyl prophylaxis practised in the Congo. On this point there is, however, room for grave difference of opinion. There are many differences between *T. gambiense* on the one hand and *T. rhodesiense* and *brucei* on the other in their general reactions.

Yorke and his colleagues have called attention to the occurrence in their in vitro experiments of individual trypanosomes of *T. rhodesiense* which remain alive in the drug solution long after the great majority are dead and disintegrated. The nature of drug resistance is discussed and the decision reached that it is probably a mutation rather than the result of selection alone, the mutation being in certain circumstances aided by selection. Let us suppose with the authors that a strain of *T. rhodesiense* comprises a mixture of individuals of different degrees of sensitiveness to drugs, some being more, some less resistant. At the commencement of treatment with the arsenical there will be a heavy muster of sensitive forms in the blood stream, and these, we may suppose, will be killed by the drug. Trypanosomes will, in other words, disappear from the peripheral blood. Repeated small doses will lead to the elimination of the more sensitive elements. The resistant survivors will themselves vary in their resisting power, and with continued treatment this process will eventually give rise to a highly resistant strain. But the development of this resistant strain depends essentially upon the presence in the original untreated population of resistant individuals. In the case of the guinea-pig in Yorke's latest report, infected with an untreated *T. brucei* strain derived from wild *G. morsitans* in Uganda, there were forms that resisted an initial dose of 0·125 g. per kg., and the progeny of these forms repopulated the blood of a guinea-pig in seven days. It is, by the way, not clear whether all Yorke's examinations are performed with stained thick blood films. It is, surely, these same resistant elements that render *T. rhodesiense* in man impervious to the trypanocidal arsenicals in doses tolerable to its host. Normal *T. gambiense* apparently does not possess such resistant forms, and is accordingly susceptible to arsenicals in doses well within man's toleration of the drugs.

I would like, therefore, to plead for an adjournment of the case before us, pending the production of further evidence. Meantime attention may well be directed to the examination of freshly isolated *T. gambiense* strains to see how they behave in laboratory animals when exposed to arsenic. Then we may learn to what extent the characters of the ancestral *T. brucei* appear in man's special offset from that stock; and in this way we may be able to assess the danger of large-scale prophylactic measures with atoxyl and its allies.

SUMMARY

The exemplary series of investigations carried out in the last few years by Yorke and his colleagues have revolutionised our conceptions of drug resistance in trypanosomiasis. As the result of these researches we now know how to maintain trypanosomes alive in vitro for a considerable period of time; we know the manner in which arsenical drugs act on the trypanosomes; how best to increase the natural resistance of a strain, and how that resistance operates; and that the resistance acquired is not resistance to arsenic but to the phenyl radicle present in all trypanocidal arsenical drugs used in treatment of the disease in man; and, finally, that a strain resistant in one species of host is resistant in another. But the final word has not yet been spoken on the subject of acquired resistance in normal *T. gambiense* against tryparsamide and its allies. The outstanding questions seem to me to be :—

(1) Can a strain of *T. gambiense* recently isolated from a patient into whose blood the trypanosome was introduced by biologically infected tsetse, acquire permanent resistance to a drug as the result of exposure to occasional small doses?

(2) If it can do so, does the acquisition of resistance in any way impair the transmissibility of the strain by tsetse?

(3) If the strain retains its transmissibility by tsetse, does the acquired resistance to arsenical drugs survive passage through the fly?

The question whether acquired drug resistance survives the passage of a strain through tsetse is but one aspect of an important biological problem—namely, the rôle of the insect intermediary in maintaining the character of the protozoon it transmits.

If Yorke and his colleagues' interpretation of their results is correct, then we must conclude that an acquired character can survive the seemingly drastic changes that a trypanosome undergoes during its cyclical development in the tsetse. Schilling, as the result of transmission experiments performed with a highly virulent strain of *T. brucei* and *G. morsitans*, has lately reached diametrically opposite conclusions, maintaining that passage through the tsetse purges a strain of all acquired abnormalities.

The subject is thus of great biological as well as practical interest and calls for the most exhaustive inquiry along several different lines of research.

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EUGENICS IN GERMANY

FIVE hundred practitioners in Saxony and Anhalt have just taken part in a course of racial hygiene at Halle under the direction of Privatdocent Dr. Kürten. The course included an introduction to raciology, human inheritance, eugenics (racial hygiene), and the new legal attitude in Germany towards these matters. At the outset of the course it was stated that in a few years proof of attendance at such a course will be demanded of all doctors and that this obligation will be legalised. In commenting on the doctor's position in relation to the new law, Dr. Heinrich Lindenau, a high legal authority, remarks that in future, apart from the eugenic indication for sterilisation, which always implies a decision of the Eugenic Court, only the strictly medical indication will be recognised—that is to say, sterilisation for curative purposes—whilst the so-called social indication disappears completely. The text of the Eugenic Law of July 14th, 1933, has now been printed [1] and runs as follows :—

Law for the Prevention of Hereditary Disease

¶ 1.—Anyone who is hereditarily ailing may be made barren (sterilised) by surgical operation, if in the experience of medical science it is with great probability to be expected that his progeny will suffer from severe bodily or mental hereditary disorders. Hereditarily ailing in the sense of this law is anyone who suffers from one of the following diseases: (1) congenital feeblemindedness, (2) schizophrenia, (3) periodic (manic-depressive) insanity, (4) inherited epilepsy, (5) inherited St. Vitus's dance (Huntington's chorea), (6) inherited blindness, (7) inherited deafness, (8) severe inherited physical malformation. Further, anyone suffering from severe alcoholism may be sterilised.

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[1] Deut. med. Woch., August 18th, p. 1297.

¶ 2.—Competent to make the proposal is the person who is to be sterilised. Should he be irresponsible or incapable of managing his affairs on account of weakmindedness, or not yet have completed his eighteenth year, then the proposer is the legal representative who requires the consent of the court for the protection of wards. In the remaining cases of limited responsibility the proposal requires the consent of the legal representative. If an adult is under the care of a guardian, the consent of the latter is required. The proposal must be accompanied by a certificate from a doctor registered in Germany to the effect that the person to be sterilised has had the nature and consequences of sterilisation explained to him. The proposal may be withdrawn.

¶ 3.—Sterilisation may also be proposed (1) by the official doctor, (2) for the inmates of a hospital, institution or prison, by its director.

¶ 4.—The proposal is to be made either in writing or dictated at the office of the Eugenic Court. The facts on which the proposal is based are to be attested by a medical opinion or in some other way. The office must inform the official doctor of the proposal.

¶ 5.—Competent to give judgment is the Eugenic Court in whose district the person to be sterilised has his ordinary legal rights.

¶ 6.—The Eugenic Court is to be attached to a magistrate's court. It consists of a magistrate as chairman, an official doctor, and another doctor registered in Germany who is specially versed in eugenics. For each member a deputy must be appointed. From the chairmanship is excluded anyone who has decided on a guardianship proposal under ¶ 2 (1). If an official doctor has made the proposal he cannot take part in the decision.

¶ 7.—The proceedings of the Eugenic Court are not public. The court has to make the necessary inquiries; it can examine witnesses and experts as well as order the attendance and the medical examination of the person to be sterilised and can have him brought if he stays away without excuse. In the examination and swearing-in of witnesses and experts as well as in the exclusion and rejection of members of the court the appropriate clauses of the civil law are applicable. Doctors who are examined as witnesses or experts are bound to give evidence regardless of professional secrecy. Courts and boards of management as well as institutions have to give the Eugenic Court information if required.

¶ 8.—The court has to decide to its own satisfaction after consideration of the total product of the proceedings and evidence. The judgment follows as a result of oral consultation on a majority of votes. The decision must be put in writing and signed by the members who were concerned in the judgment. It must give the grounds on which the sterilisation is determined or declined. The decision is to be communicated to the proposer, the official doctor as well as to the person whose sterilisation is proposed, or, in case he is not competent to propose, his legal representative.

¶ 9.—Against the judgment an appeal can be lodged by any of the persons mentioned in ¶ 8 (5) within a period of a month after its delivery, notice to be in writing or dictated at the office of the Eugenic Court. The appeal has the effect of delaying execution of the judgment. The appeal is decided by the Eugenic High Court. Until expiration of the period for appeal the status quo may be resumed in accordance with the provisions of the common law.

¶ 10.—The Eugenic High Court is attached to a High Court of Justice and covers the same area. It consists of a judge of the High Court, an official doctor, and another doctor registered in Germany who is specially versed in eugenics. For each member a deputy must be appointed. ¶ 6 (2) applies here. For the procedure before the Eugenic High Court ¶ 7 and 8 apply. The judgment of the Eugenic High Court is final.

¶ 11.—The surgical operation necessary for the sterilisation may be carried out only in a hospital by a doctor registered in Germany. He may only operate when the decision ordering the sterilisation has been made final. The supreme State authority determines the hospitals and doctors to whom the carrying out of the sterilisation is to be committed. The operation may not be done by a doctor who has made the proposal or has been a party to the procedure. The operating doctor has to make a written report to the official doctor on the execution of the sterilisation, stating the method employed.

¶ 12.—If the court has given its final decision on sterilisation, it is to be carried out even against the will of the person to be sterilised, unless he alone made the proposal. The official doctor has to requisition the necessary measures of the police authorities. If other measures do not suffice, the use of direct force is permissible. Should circumstances arise which demand another testing of the situation, the Eugenic Court must take the matter up again and forbid for the time being the carrying out of the sterilisation. If judgment was given against the proposal, revision is only permissible when new facts have arisen which justify the sterilisation.

¶ 13.—The costs of the legal proceedings are borne by the State Exchequer. The costs of the surgical operation in the case of an insured person are borne by the sickness insurance office, in the case of other needy persons by the public assistance. In all other cases the costs up to the minimal scale of the professional fee and the median cost in the public hospitals is borne by the Exchequer, beyond that by the person to be sterilised.

¶ 14.—Sterilisation, not carried out according to the terms of this law, as well as removal of the genital glands are only permissible when performed by a doctor according to the rules of medical science to avoid serious danger to the life or the health of the person on whom the operation is undertaken, and with his consent.

¶ 15.—The persons concerned in the proceedings or in the carrying out of the surgical operation are bound to secrecy. Anyone who breaks this obligation without authorisation is to be punished with imprisonment up to one year or with a fine. Prosecution is only undertaken if a charge is made; the charge may be made by the chairman.

¶ 16.—The execution of this law is for the State governments. The supreme State authorities determine, subject to the provisions of ¶ 6 (1) and 10 (1), seat and area of the deciding courts. They nominate the members and their deputies.

¶ 17.—The Home Secretary in collaboration with the Minister of Justice issues the necessary regulations for the carrying out of this law.

¶ 18.—This law comes into force on Jan. 1st, 1934.

An Advocate of Eugenic Castration

One of the chief protagonists in the conflict about whether the race can be improved by sterilising and castrating the unfit is Dr. W. Weygandt, who occupies the chair of psychiatry at Hamburg. He considers [2] that the harmful physical and psychical effects that castration is said to cause are much overrated. Why, he argues, if male animals can be castrated without detriment to their health, should the operation be so harmful to man? He quotes numerous historical examples of distinguished eunuchs, but brings even more convincing evidence in a summary of a paper read by an eminent Danish judge, August Goll, at a conference of the Society of Criminal Biology held in Hamburg last June. Judicial castration is practised in Denmark, not as a substitute for punishment but in order to prevent the repetition of sexual offences and to shorten the period of preventive detention. Up to May 1st of this year 41 men had been castrated, and their health and behaviour had been under very close observation. The results, according to Judge Goll, were much better than had been expected. None of the prisoners seemed to have deteriorated either psychically or physically, and they appeared to get on much better with the warders and other prisoners and to be fully capable of work. A few of them missed their erotic excitement; many of them seemed undecided whether to regret the loss of it or not, but the majority said they were contented. One man declared himself pleased with the operation from every point of view, and especially remarked that he could do his work much more easily, "like play"; he sweated more than he had, but that did not matter much; he had no sexual feelings, and wished that his friends in the prison would undergo the same operation. Another man felt as though a weight had been lifted from him. A sadist said, two years after his castration, that he had felt better than he ever had before it: instead of being often troubled with bad dreams he slept soundly and well; moreover, he could work as well as ever and could stand the heat of the stokehold without trouble. He looked on his early offences as something entirely apart from himself, and thought that castration was the only thing which would stop offences of the kind in most cases, and that it would be a boon to a number of men like himself. The remedy is, however, not infallible, for Judge Goll also related the case of a schoolmaster who had been castrated for repeated offences with boys; he was discharged because his mental condition was not satisfactory, but was confined again the next year for a repetition of the same offence.

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[2] Münch med. Woch., August 18th, p. 1275.

Dr. Weygandt concludes from his researches that the organic consequences, considerable in young men and less marked in older men, do not include serious pathological states and can be largely countered by glandular therapy. He does not think that castration is of much value unless it can be made compulsory. He recommends it for violent and emotional crimes as well as sexual offences, and points out that it would probably be useful for the violent patients who give the staff of mental institutions so much trouble and account for so much of the expense of maintenance with padded rooms, prolonged baths, and night nursing. He has no practical experience to go on, but quotes Dr. H. W. Dudgeon who, as the superintendent of mental hospitals in Cairo, has seen a number of eunuch patients and has found them childlike and quiet to handle. Dr. Weygandt suggests as a start releasing suitable castrated patients under guardianship in order to acquire information. The objection that castration will lengthen life and thereby put up the cost of maintenance is, he thinks, groundless, for many violent patients seem to do themselves no harm and to continue for years in the full possession of their physical powers. It is possible, he thinks, that the present dislike of mental institutions might be increased if castration is one of the fates that may befall a patient, but it would of course never be carried out except after a long period of observation.

In much of the opposition to eugenic and economic restriction of the sexual function Dr. Weygandt finds an expression of what he calls the "anti-social hedonism," which has turned Germany into a paradise of the unfit. Drastic measures like sterilisation and castration will, he thinks, not only prevent the further damaging of the race by unfit persons, but will also provide valuable biological information for the guidance of eugenists in the future.

MEDICINE AND THE LAW

Community Risks and Workmen's Compensation

THE disastrous New Zealand earthquake made its contribution last month to the law of workmen's compensation when the Privy Council disposed of appeals respecting New Zealand workmen injured by the collapse of houses and by falling debris. The statute law of the Dominion, almost identical with our own Acts, presents the same problem in the seemingly simple words "accident arising out of the employment." How far can perils which are "community risks" be deemed to arise out of an individual's work? The dangers of earthquake, like those of sunstroke or frostbite, may be common to all persons present in a particular locality. Does this mean that the workman thus injured is not to receive compensation? English decisions exhibit some diversity as the following examples show. Bad weather may reasonably be called a "community risk": we all suffer from it in England. If the temperature anywhere is cold enough, any of us may be frostbitten, whether we are workmen or not. When a seaman employed on his ship at Halifax, Nova Scotia, suffered from frostbite, our courts refused him compensation, his injury not being deemed to arise "out of the employment." Halifax, said Cozens-Hardy, M.R., is a place where people do get frostbitten; the liability is "one of the normal incidents to which everyone is subjected by reason of the severity of the climate" (Karemaker *v.* Owners of s.s. *Corsican*). So also in Warner *v.* Couchman (1912), a man whose hand was frostbitten while he was driving a baker's cart on a bitter English winter's day failed to make good his claim; the county court found no evidence of any special exposure to severe weather, and the higher tribunals declined to disturb this adverse finding of fact. The erratic incidence of lightning is another "community risk." In an Irish case in 1908 a claim failed where a roadman had been struck by lightning when standing out in a storm to clear gratings and prevent a flood. The court said he ran no greater risk than any member of the public who was within the area of the storm. But the trend of judicial decisions has undoubtedly moved gradually in favour of the workman, and the courts are now more easily satisfied of the existence of special exposure to risk. A seaman who suffered sunstroke while employed in painting his ship in Mexican waters, receiving both the direct and the reflected rays of the sun as he worked, was held entitled to compensation (Morgan *v.* Owners of s.s. *Zenada*). There was the same result in another sunstroke case when the workman had been placed, in Lord Shaw's words, in a zone of special danger, being employed for some hours on a blackened steel deck under the blazing sun of Hayti. In 1904, when a bricklayer had been killed by lightning while at work on a scaffold 23 feet from the ground, evidence was given that this elevation involved an additional exposure to lightning;

it was held that the lightning was an accident arising out of the employment and that compensation was payable (*Andrew v. Failsworth Industrial Society*). In another of what Lord Shaw has called the "*location*" *cases*, a workman had to stand at the bottom of a pit in a position of extreme cold; pneumonia followed, and compensation was awarded (Coyle *v.* Brown). Street accident cases, where a workman is injured, follow the same principle. Thus in Dennis *v.* White (1917), a boy employed as a plumber's mate and often sent on errands on the firm's bicycle was knocked down by a motor-car near Sloane-square. The House of Lords gave him compensation. All of us may be knocked down by motor-cars in London streets, but this boy's accident could be said to be due to a risk of the streets which his employers required him to face.

Lord Atkin's Judgment

In the New Zealand case lately before the Privy Council, Lord Atkin delivered a judgment which clarifies the law. If a workman, he says, is injured by some natural force such as lightning, the heat of the sun, or extreme cold, which in itself had no kind of connexion with the employment, he cannot recover compensation unless he can sufficiently associate the injury with his employment. He can do this if he can show that the employment exposed him in a special degree to suffering such injury. But if he is injured by physical contact with some part of the place where he works, he at once associates the accident with his employment (apart, of course, from questions of his own misconduct), and nothing more need be proved. So if the roof or walls fall in on him, or he slips on the premises, there is no need to make any further inquiry as to why the accident happened.

The Privy Council judgment declared itself to be in accordance with the House of Lords decision in Thom (otherwise Simpson) *v.* Sinclair. There a woman, employed in packing kippered herrings in an Aberdeen shed, was buried beneath debris which fell through the roof because a brick wall on adjoining ground had collapsed. Her employment was packing kippered herrings; did the accident arise "out of the employment?" The accident, said Lord Haldane in 1917, happened because the woman was employed in the particular spot on which the roof fell. If so, the accident arose out of the employment and there was no need to search further for causes more remote than the fall of the roof; "there need be no other connexion between what happened and the nature of the work on which the injured person was employed." The House of Lords on this occasion had to face the curious case of Craske *v.* Wigan, which had distracted the court below. That was the case of an accident to a lady's maid who was doing needlework for herself when a cockchafer buzzed in at the open window; up went her hand and she injured her eye. It was argued on her behalf that she would not have met with this accident if she had not been in that employment at that time and place. The Court of Appeal thought the argument was not strong enough. In the Sinclair case the House of Lords would not go so far as to say that the decision in Craske *v.* Wigan was wrong. In the face of such subtleties we can be the more grateful for the clarity of the recent Privy Council judgment.

Wife's Liability for Husband in Mental Hospital

THE Brighton justices were recently asked to make an order against a wife for the support of her husband. The wife was a teacher employed by the Brighton education authority at a salary (after deductions) of over £4 a week, supplemented by 10*s.* from national health insurance; the husband had been certified insane, and was an inmate of the county borough mental hospital at Haywards Heath. His maintenance cost the public assistance committee £1 3*s.* 7½*d.* per week; the wife contributed 2*s.* 6*d.* a week, and the public assistance committee invited the justices to direct that her contribution be raised to £1 a week. On the one side was the argument that the wife is liable for the support of her husband, just as the husband is liable for the support of his wife. On the other side it was contended that the wife's salary was not her property for the purpose of supporting her husband; she was also supporting a daughter of 16 who had won a scholarship to a secondary school and would soon be going to a training college. This statement inevitably raised controversy. Ought the girl to have unlimited opportunities regardless of the public expense, or ought her mother to pay her way? The representative of the public assistance committee put one side of the case by observing that many people would like to send their sons to Oxford and Cambridge but found themselves unable to do so owing to other responsibilities. The wife countered this argument by saying that her husband's disabilities were due to his war service. The justices awarded 15*s.* a week in lieu of the wife's present contribution of 2*s.* 6*d.* The order seems reasonable, since the mental hospitals of local authorities must obtain contributions from those who can afford to pay. The chairman of the bench fanned the flames of controversy afresh by remarking that the daughter might go into domestic service instead of going to college.

Misdescription of Fish

To sell fish under its wrong name is not so serious a matter as to sell fish which is dangerous to health. The practice, however, is misleading to those who make nice calculations of food values, and there seems no reason to be over-tender towards sellers who are guilty of a species of commercial fraud. The general purposes committee of the Middlesex county council has reported that in fried fish shops dog-fish is sold as hake, and witches and megrims as lemon-soles or plaice, and that many cheap kinds of fish (such as cat-fish, pollack, and coal-fish) are never sold under their own proper names. The county council has been prosecuting retailers for thus selling to the prejudice of the purchaser an article of food which is not of the nature demanded by the purchaser. This is an offence under the Food and Drugs (Adulteration) Act. The Merchandise Marks Act of 1887 can also be invoked against trade misdescriptions, though under this statute there are possible defences where the seller can clear himself of fraudulent intent. One of the legal journals has pointed out that these statutes are not particularly appropriate weapons for punishing the misdescription of fish. The subdivision and sealing of samples and other steps usually taken in prosecutions under the Food and Drugs Acts seem inconvenient; nor are analysts necessarily ichthyological experts. In Smart and Son *v.* Watts (decided under the Margarine Act, which was superseded in 1928 by the Food and Drugs (Adulteration) Act) it was held that, where margarine had been sold without the necessary label and the grocer's assistant had admitted the offence, the admission was not enough but the machinery of analysis must be fully employed. A method which may be suitable for milk or margarine is not necessarily suitable for dog-fish and cat-fish.

MENTAL CARE IN 1932

A DIFFICULT YEAR

THE past year has been a difficult one for workers in the field of mental health. Ready money has been scarce and capital expenditure has had to be pared down to the lowest limit. Nevertheless, the Board of Control is able to report progress.[1] There has been a steady increase in the number of out-patient clinics and, with comparatively few exceptions, the facilities for out-patient treatment are being increasingly utilised. The position remains much as it was last year, and the Board hopes to give some figures in a later report. It is not surprising that some disappointment should have been expressed that a considerable proportion of the patients has consisted of the chronic neurotics who are the despair of every general hospital. Nevertheless, as the Board points out, even for these something may be done, and a clinic has not failed merely because at the start it does not attract the early cases for whom it was designed. The Board stresses the need for the psychiatrist in charge to obtain the coöperation of the local general practitioners. While it would be unwise to make every patient bring an introduction from a doctor, it is clearly desirable that the psychiatrist should know as much as possible about the history, and that he should keep the family doctor in touch with progress. It is vital, says the Board, to avoid any suggestion of encroaching on the legitimate sphere of private practice, and no clinic can function effectively unless the general practitioners feel sure that its object is to help them as well as their patients.

OBSERVATION AND CERTIFICATION

The number of temporary patients admitted was again disappointingly small—only 2 per cent. of the total direct admissions. In institutions which only take private patients it was notably higher, and when the figures of the individual institutions are analysed, it appears likely that such percentages as 6 and 7 will be doubled before very long. Actually the institution with the highest percentage of temporary admissions was the Derby borough mental hospital, which admitted no less than 34 out of 100 temporary patients on this basis. The Board suggests that the small figures are due to some extent to the natural reluctance of public assistance officers to substitute a new and somewhat complicated procedure for one with which they are thoroughly familiar; it fears, however, that the result is due in large measure to the unwillingness of general practitioners to avail themselves of the new facilities for having non-volitional patients treated without certification. In many areas it has long been the custom for practitioners to send patients with symptoms of mental disorder to the observation wards of a public assistance institution. It is argued in support of this practice that it not only avoids the risk inherent in recommendation or certification, but also lessens the chance of friction with the relatives by transferring an invidious task to a public official. The Board feels, however, that practitioners who follow this practice do not sufficiently appreciate how much the patient may suffer if they thus shirk their medical responsibilities. When, as so often happens, the need for in-patient treatment is beyond question, it is clearly in the there has interest that he should be sent as quickly to be requir to the only place where he can have the necessity [illegible]ly stages continuity of treatment is He also mentio need for a proper essential. To send an acute case to an observation ward when it is obviously going to be necessary to transfer him later, means at best an avoidable delay, and at worst a serious disturbance of the patient, and may result in certification although temporary treatment might have been sufficient.

The number of voluntary admissions to public mental hospitals is slightly better than that of the previous year, but insufficient use has been made of the procedure in a number of areas. The Lancashire mental hospitals board have decided to reserve 5 per cent. of their beds for voluntary patients. Cardiff had no less than 47 per cent. of voluntary patients among its direct admissions, and another 10 hospitals had over 20 per cent. and 12 over 15 per cent., but there were 14 which admitted no voluntary patients at all. While realising the difficulties imposed on authorities by shortage of beds, the Board points out that there is no economy in refusing admission as voluntary patients to those who not long afterwards will have to be received under certificate and probably kept much longer.

The increase in the total number of patients in public mental hospitals was 1314. This is the lowest net increase since 1919, but must not, according to the Board, be taken to indicate any diminution in the incidence of mental disorder. It is due partly to an increase of 559 in the number of deaths, and partly to an increase in the number of patients in public assistance institutions. This latter increase, so far as it represents the transfer of the quieter chronic patients, is in accordance with the policy which the Board has been urging on local authorities. The commissioners again urge authorities to make a systematic review of all chronic cases in order to find room for the acute cases, some of whom are kept in public assistance institutions without effective treatment, to the detriment of their chances of recovery.

OCCUPATION FOR MENTAL PATIENTS

The recent visit of the Royal Medico-Psychological Association to Santpoort has awakened much interest in this valuable adjunct to treatment. The commissioners have discussed the subjects with many superintendents, but have still found considerable misunderstanding of the nature and objects of occupational therapy. To teach a small group of quiet patients to make leather bags to sell at the annual bazaar may, says the report, be useful, but it is certainly not occupation therapy. The show case which some hospitals display with pride may be definitely harmful if it is allowed to concentrate interest on the sale value of the work. Success or failure is to be tested by the effect on the patients. An idle patient ought to be regarded as a reproach to the hospital; practically every ambulant patient can be employed, and is infinitely better and more easily controlled when he is employed. The best English hospitals still fall far short of Gutersloh and Santpoort. The Board is convinced that the adoption of a system like that of Gutersloh does not necessitate any substantial increase in the nursing staff apart from the employment of a few specialists, though it does involve readjustment of duties and a change in methods of training. It may make a further demand on the medical staff, but there is a case for an increase on other grounds. It is a *mistake*, says the Board, to suppose that occupation therapy is impossible without numerous costly and highly trained occupation therapists. The system can only be introduced gradually, and there will be many mistakes and disappointments, but of its value and success the Board has no doubt whatever.

Report of the Board of Control. Office. 1933. Pp. 104. 2s.

In response to the Board's suggestion in the last report, nearly all the public mental hospitals now subscribe to the Joint Red Cross library. It suggests that a reading room for the benefit of the more trustworthy patients would add greatly to the usefulness of the hospital library. Moreover, it would be as easy to bring patients to the library to choose their own books as it is to bring them to the canteen to make their weekly purchases. Instead of leaving the control of the library in the hands of any officer who has time to spare, the Board recommends visiting committees to seek the advice and assistance of the skilled librarians of municipal libraries. It also believes that there is scope for voluntary workers in mental as in general hospitals, especially under skilled direction.

The Board deprecates the weekly dietary which a few hospitals still maintain. If it is not practicable to adopt the three-weeks' plan, the commissioners suggest the introduction of an occasional surprise dish. Apart from monotony, the quality of the food is generally good. In the bigger hospitals a fish-frier has been found very popular, for a generation accustomed to fish and chips cannot be expected to eat steamed cod with anything but reluctance. Too many hospitals spoil excellent material and cooking for want of a little care in serving the dinner reasonably hot. An increasing number of hospitals are trying to give their better patients some choice of colour and pattern in dress. It is a step towards recovery when a patient can be induced to take some interest in her appearance. It is true, says the Board, that some patients are so demented that they are indifferent to what they wear, but only advanced dementia would reconcile the average woman to the type of garments still worn in some hospitals. The installation of steam presses has made considerable improvement in the self-respect of men patients. Clothing which no sane person would wear except under compulsion ought not in the opinion of the commissioners to be inflicted on convalescents or other well-behaved patients.

Mental Deficiency

Satisfactory progress has been made in spite of financial difficulties: 2300 new beds have been added, but only in completion of schemes started before the crisis. The postponement and abandonment of schemes will be reflected in future figures. The Minister of Health opened Hortham Colony in April, 1932. This is the first complete colony to be constructed by a local authority, and will take young and trainable cases from Bristol, Cardiff, Bath, and Dorset. It has 600 beds but is planned for expansion. St. Catherine's Colony, serving the West Riding of Yorkshire, was opened during the year, and Surrey opened the first instalment of its colony at Botley's Park. The Board still advises local authorities to begin with a limited number of villas and postpone the construction of the administrative unit and ancillary buildings. Though this system has obvious drawbacks in economy and efficiency, there is at present no practicable alternative.

AUSTRALASIA

(FROM OUR OWN CORRESPONDENT)

A CANCER CURE TESTED

RECENTLY a company known as the Roberts Clinics Pty., Ltd., was formed in Queensland to exploit an alleged cure for cancer. As the result of a number of incidents which followed the formation of this company, the Queensland Government decided to appoint a medical committee to investigate its claims. Volunteers—people suffering from cancer who desired to submit themselves to the cure—were called for by public advertisement, and 37 of those who applied were examined. Sixteen of these were rejected by the committee as unsuitable, some not being cases of cancer at all, others being too advanced. Of the remaining 21, Mr. Roberts was to have the final right of rejection, and rejected all but three. These were treated at a hospital specially staffed and equipped for the purpose by the Home Department.

The progress of the three patients under treatment was as follows: The first case was one of a large infiltrating tumour of the left cheek. Into this mass Mr. Roberts injected a fluid, some of which ran on to the cheek causing a second degree burn. The effect of the injection was that of any escharotic, and in the committee's opinion the man's condition was palpably worse, and the tumour has definitely become more actively malignant. The second case was one of a cancer of the rectum. An abscess formed as a result of treatment, she became definitely worse, and the treatment was abandoned. The third case was one of cancer of the body of the stomach. This was treated by injecting some dilute acid through a stomach-tube. This patient showed no sign of improvement, and died a short time after treatment had been given.

The subsequent report of the medical committee referred to the ignorance of the claimant of many simple facts concerning cancer, medicine, and chemistry, and criticised the facility with which a layman had been able to float a company to commercialise the treatment of a disease such as cancer. The committee pointed out that the use of escharotics or acids to treat external cancer was based on wrong premises, and their final conclusion was that the methods employed were a sham and a fraud, and that any attempt to treat internal cancer by injection of such substances was nothing short of criminal.

SWITZERLAND

(FROM OUR OWN CORRESPONDENT)

THE LATE PROF. SAHLI

THE appreciation in your issue of August 19th (p. 429) of Hermann Sahli as a great clinical teacher, although no more than just, has given much pleasure. The bedside portrait was fitting in such a sketch or I should have asked you to reproduce the bronze memorial tablet in the medical school which recalls the philosopher that he was. Sahli, like Kocher, was a son of the soil, but it is worth recalling that he was also a fervent advocate of the study of Latin and Greek as a preliminary of the medical curriculum. He considered the classical training the only way to logical thinking. He left, as only child, a daughter married to Minister W. Stucky, leader of the Swiss delegation at the Economic Conference in London.

PROFESSORIAL CHANGES

A number of other changes have recently oc[illegible]
in the staff of the Swiss medical facult ce, the
Guido Miescher, of Basle, has been nomi chinery of
chair of dermatology in Zurich, vaca ethod which
death of Prof. Bruno Bloch. Mie ne is not neces-
many years the collaborator fish.

specially been engaged in research work on radiation treatment. Prof. Jacob Klaesi, of Glaris, has succeeded Prof. von Speyer, on his retirement, as director of the mental clinic in Berne. Klaesi is one of Bleuler's brilliant pupils. He was first assistant at the Basle psychiatric clinic before becoming head of the private mental home near Zurich, where he has been for six years. At Geneva, the late Prof. Kummer has been replaced in the chair of surgery by Dr. Albert Jentzer, surgeon attached to the Hôpital Cantonal, who has done excellent work in brain surgery.

PUBLIC HEALTH SERVICES

School Buildings

MANY of the recent reports of school medical officers refer to the condition of the school buildings and appliances. For the most part improvements have been limited to what was considered vitally necessary; but defects are recorded which, though not immediately dangerous, call for early remedy—and there are optimists in the service who see omens that the stringent cuts in expenditure may shortly be moderated. Dr. G. K. Bowes (Bedford) writes:—

> "No important alterations were made during the year under review in the school buildings. Owing to the financial circumstances of the time it was not possible to make any further progress with the scheme for converting the obsolete trough closets and relaying old and defective drainage systems, which it was proposed to carry out in those elementary schools, the greater number in the borough, where these conditions still exist."

Dr. A. G. M. Severn (Pontypridd) is able to give a satisfactory account of the hygiene of the schools in his area; repairs are carried out to all premises when required with due regard to economy. It is only of new educational developments that he has to say:

> "In consequence of the Government's economy measures, the whole of the extensive programme in respect of educational development has been postponed, with the exception of the proposed handicraft and science rooms at the Hawthorn senior mixed school."

Dr. J. Robertson (Darwen) reports:

> "It is to be regretted that some of the schools have still in use the out-of-date, long combined desk and form. Such furniture is not adapted for children between the ages of 5 and 14 years, and causes the children to be too closely packed."

In Hendon, on the other hand, a considerable list of improvements is recorded, including reconstruction and modernisation of lavatories, improvements in lighting, heating, ventilation, and redecoration. To those with little practical experience redecoration may sound like a luxury, but in fact the illumination of a class-room may be improved as much as 20 per cent. by clean light-coloured walls, and this is only one good effect of many. In some areas there is obviously serious need for alteration. Dr. D. E. P. Pritchard (Caernarvonshire), for instance, reports in his area the number of schools—

without an ample supply of water ..	33
with defective ventilation	3
with insufficient or defective heating ..	3
with unsuitable desks	28
with unsuitable lavatories, &c.	12
with unsuitable lighting	7

A special feature noted by Dr. C. Franks (Durham) is an effect of the introduction of the Hadow scheme of reorganisation:

> "One matter to which frequent attention is drawn is the unsuitability and inadequacy of cloak-room accommodation and particularly the absence of suitable provision for the drying of wet clothes. With the reorganisation of schools there has been a tendency in some districts for children to be required to travel longer distances thus increasing the necessity for suitable cloak-room provision."

He also mentions a difficulty of long standing, the need for a proper place for medical examination. There should be in the large new schools a special room which could be used for this purpose. Dr. Middleton Martin (Gloucestershire) in a tribute to the help given by teachers says, "such help is all the more welcomed as—under the conditions usually obtaining—the school routine is so seriously disturbed by the visits of doctors, dentists, and nurses." His description of these places of inspection is worth quoting:

> "The examinations of the children are usually conducted in a class-room reserved for the occasion and the children are taken into another room for instruction often with some temporary overcrowding. This was arranged in 369 departments: at 12 the teachers' room was made available, and in one case the managers' room. The domestic science and manual rooms were used in 12 schools, at 4 a part of the room was partitioned by a curtain, in 3 cases the village room was used and in one place the out-station."

Dr. Martin does not suggest the provision of a special room, but the advantages are obvious; at present it is only because the doctors are on such good terms with the teachers that more difficulty does not arise. Often the selection of a suitable place is really the choice between various evils. The teachers' room is usually small and is the only place where the staff can lunch, so that it is hardly fair to press for its use for medical work. A class-room cannot always be emptied of its usual inmates without disturbance of school routine, and overcrowding of other class-rooms. The use of part of the school hall screened off may sometimes be satisfactory, but more often there is a draught while the inevitable coming and going may make auscultation very trying. There is the alternative of examining the children off the school premises, but for routine examinations this has many disadvantages. When 1*d*. a week is not thought too much to spend on securing the health of a child it may be thought reasonable to provide in each new school a room for medical inspection. Some progressive authorities are already doing this.

Food Poisoning at a Hospital

An outbreak of gastro-enteritis occurred in July among the staff of the Burnley Municipal Hospital. Some of the staff became ill on Thursday, July 6th, the remainder the following day; in all 22 nurses, 2 maids, and 1 porter were attacked. The onset in each case was sudden, and the symptoms were severe abdominal pain, diarrhœa, vomiting, considerable sickness, and pyrexia. In those most severely ill the temperature soon after onset rose to 103° and 104° F. There was no hæmatemesis or melæna. The onus of the attack was on the small bowel. None of the patients in hospital suffered. It was clear at once that the outbreak was to be attributed to food taken on July 5th. The staff had bacon and eggs for breakfast, frozen mutton for lunch, frozen salmon and salad for supper. The eggs were fresh from a local poultry farm; the mutton was eaten by all the staff (about 70 in number) and most of the patients in the hospital. Separate rolls of Irish bacon were used for the staff and patients. The roll of bacon for staff use came into the hospital store on the morning of July 1st direct from a wholesale

CORRESPONDENCE

THE FUTURE OF MEDICAL PRACTICE

To the Editor of THE LANCET

SIR,—In my letter of July 29th I tried to focus attention on one point—viz., whether, in view of the vast expansion of knowledge that has taken place, it is any longer possible for the general practitioner to practise every branch of his profession and accept responsibility for his actions. And I came to the conclusion that it was not. None of your correspondents has given a direct answer to the question; all of them have suggested ways of overcoming the difficulty.

The answer to my question began to be given many years ago; and it is still in process of being answered. A visit to the general practitioner's "stables" will show that the doors are standing wide open and that many of his best mounts have gone. Public health and social services have helped themselves to a good many. Midwives have got away with two-thirds of his midwifery; and when midwifery becomes an organised service, with maternity hospitals dotted about the country, further inroads will be made on the fraction that is left. The insurance panel has swept away a great many patients who previously paid small fees. Consultants have gone on the panel of the London County Council and have become its employees with a fixed rate of remuneration. The voluntary and municipal hospitals have definitely taken a hand in private practice, and now compete with nursing-homes and the doctor. With ample funds, an up-to-date equipment, and a highly trained staff ready to undertake all the investigations that are so often necessary before a diagnosis can be made, is it not inevitable that the public will drift to the hospitals rather than remain with a general practitioner, who through no fault of his is quite unable in these days to be the universal purveyor he was wont to be?

The signs of the times have answered my question. Unless the medical profession can find some means of overcoming its difficulties, the forces that are hemming it in must soon overpower it, and medicine will lose its independence.

I am, Sir, yours faithfully,

August 29th, 1933. J. H. E. BROCK.

THE COMPLAINT OF THE FAMILY DOCTOR

To the Editor of THE LANCET

SIR,—Although I regret that Dr. Alfred Cox should have written to a lay paper on this medical topic, yet because of the truth in it, and the evil beneath it, the publication must prove beneficial to both the people and the profession. At present the weight of important medical work cannot be deflected from the hospitals; and the burden of enormous practices must bear down the capabilities of the medical attendants. In my early days I could not pay more than 30 visits per diem in a town out of a list of 70 names to be visited; and my principal's list of over 400 confinements attended per annum astounded me. We did as well as we could, but such work with all modern conveniences and up-to-date requirements is impossible. Whilst specialisation is confined to a limited number in this country, every man has his own especial strong point, from the practice of which he may be excluded by an explosion of a weak one. That may wreck his career; yet the circumstances of his competition compel him to take everything. The only cure I can see for this is a State medical service with distribution of cases according to capabilities.

I am, Sir, yours faithfully,

Chaceley, Gloucester, August 29th, 1933. JOHN GOOD.

To the Editor of THE LANCET

SIR,—Dr. Cox's letter in your issue of August 19th (p. 439) seems to me to evade the issue. He affirms that, in writing the article, he thought he was helping the general practitioner. It is difficult to see how some of his statements could help anybody. He tells the practitioner to "wake up" and "ask himself why the enterprising tradesman could find people to accept his cheap doctor; and why the municipal clinics were employing whole-time doctors." His answer is, "that the doctor was not catering for poor people on terms they could afford, and that the clinics were established to do necessary work which most family doctors had never done, for various reasons." He urges the practitioner to equip himself to enter into competition with the municipal clinics. How can he? Unless he is going to do the work for nothing, what chance has he? Surely it was because practitioners could not afford to give their services gratis that these public services were introduced. To say that the practitioner had never done that job is surely misleading. He certainly did not do the amount that is now tackled by clinics because people did not consult him, but he did a lot of it for very little return.

Again, why lend colour to the myth that hospital treatment is always superior to that supplied by the practitioner? Dr. Cox deplores what he describes as "a scandalous waste of good service to employ many greatly skilled (and unpaid) men of the highest standing in doing work which any general practitioner ought to be able to do. . . ." Dr. Cox must know that they do not, in fact, do such work. It is done by out-patient officers or house physicians—men of less experience than the practitioner himself. Such a statement would be interpreted by the public as an admission that they do not get their money's worth from their family doctor. As I pointed out, hospitals have no right to refuse any treatment if they offer their resources for a small weekly payment, and the number of out-patients must of necessity increase under such a scheme. Surely, herein lies a reasonable explanation of crowded out-patient departments. Why blame the general practitioner for it all?

"Overdriven doctors" in hospital receive sympathetic consideration from Dr. Cox, but the practitioner who has to *visit* his patients is damned for his inefficiency. Are the number of doctors who treat their panel patients with "indifference" so numerous that the matter warrants publicity in a newspaper? The insured person is suspicious of a State scheme already without being encouraged by influential members of our own profession. In my experience the general practitioner does his job as thoroughly and conscientiously as any other branch of medicine. The defaulters are in the vast minority, and I think I and other practitioners are justified in taking exception to what he says. Had the article appeared in a medical journal the matter would have been altogether different—it could have been discussed.

Why Dr. Cox introduces the question of a Sta medical service I cannot see. This seems to me t have nothing to do with the argument. After all, the National Health Insurance, which Dr. Cox supports, was recognised at the time of its introduction as the thin end of the wedge, and it is no surprise to some of us that a State scheme is in the offing. Like him, I detest the idea of such a service, but I am persuaded that the younger generation now in training will wish it, and though many practising doctors will attempt a fight, it will be a losing one comparable to that of 1912.

I am, Sir, yours faithfully,

CYRIL SHERRIS, M.B., B.S.

Cheshunt, Herts, August 19th, 1933.

OUTDOOR SHELTERS IN LONDON PARKS

To the Editor of THE LANCET

SIR,—With reference to the annotation on this subject in your issue of August 12th (p. 372) I can, as chairman of the Parks Committee of the London County Council, assure you that this committee are fully alive to the benefit which old people and convalescents derive from open-air shelters, and no doubt in the future they will bear this in mind. Even in these times of stress, when public expenditure has to be carefully watched, shelters are being erected or are being contemplated to protect young and old; also extra seats are being provided. I feel sure that what your correspondent desires will come about in the course of time. Meanwhile I think that Londoners have every reason to be proud of their magnificent parks, which compare favourably with those of any other city in the world. I can assure you that the matter which your correspondent has at heart, and with which I fully sympathise, will continue to receive the attention of this and future park committees.—I am, Sir, yours faithfully,

WILLIAM SIDNEY.

Penshurst-place, Kent, August 16th, 1933.

ÆTIOLOGY OF PELLAGRA

To the Editor of THE LANCET

SIR,—In her valuable review of the current theories of the ætiology of pellagra (August 12th, p. 341), Dr. Harriette Chick emphasises the "almost invariable" association of the disease with the use of maize as a staple cereal in diet, and suggests that the disease may be caused by a toxic substance derived from maize, which can be neutralised by vitamin B_2 if present in the diet in sufficient amount. In considering such a theory from the clinical point of view, the first question that will arise is: Can pellagra occur in the human subject when maize is excluded from the diet? The small but important group of cases in which the typical pellagroid syndrome has occurred secondarily to gastro-intestinal disease provides strong evidence, I think, that it can. In such cases a true deficiency state has arisen from interference with the ingestion of food (due to carcinoma or stricture of the gastro-intestinal tract) or with the assimilation of an otherwise adequate diet (due to chronic diarrhœa from colitis, tuberculous enteritis, and possibly cœliac disease). In some of the reported cases the diet had been voluntarily limited to fluids, and in one instance the condition arose during feeding by jejunostomy.

The reports do not in every case state specifically the exact diet that had been taken before the onset of symptoms, but in the majority there is evidence that maize had been excluded or eaten in minimal quantities only. In one such case, that of a boy of 9½ years, which I had the opportunity of investigating and subsequently reporting (Amer. Jour. Dis. Child., 1930, xxxix., 1036), defective assimilation due to tuberculous enteritis resulted in the classical signs of pellagra developing whilst the patient was taking a mixed and normally adequate diet which had never included more than minimal quantities of maize. It is probable that these cases are commoner than is generally recognised, since they are liable to occur in non-pellagrous localities and in communities where maize is eaten to a very small extent. Thaysen has recently (Acta med. Scand., 1932, lxxviii., 513) collected reports of 51 typical cases, including 4 of his own observed in Denmark, 3 of which appear to have been on a maize-free diet. The value of future reports will be enhanced if they specifically state whether maize was included in, or absent from, the diet.

Whilst this group of cases cannot, in the present state of our knowledge of the mechanism of vitamin absorption, be said to throw any light on the relative importance of protein and vitamin deficiency, it does appear to provide evidence against regarding maize toxin as an essential factor in the ætiology of the disease.

I am, Sir, yours faithfully,

London, August 18th, 1933. RICHARD W. B. ELLIS.

To the Editor of THE LANCET

SIR,—I have read with great interest Miss Harriette Chick's De Lamar lecture and your leading article upon it in the following issue (p. 426). As far back as the year 1924 I drew the attention of the late Sir Andrew Balfour, then director of the School of Tropical Medicine, to the fact that the theories of protein deficiency and vitamin deficiency were quite inadequate to explain the disease. The same applies to the toxin theory propounded by Stockman and Johnston recently. My own views as to the ætiology of pellagra were fully set forth in an article entitled "The Problem of Pellagra" (*American Medicine*, April, 1925), in which I gave my reasons why this disease should now be considered as a disorder of metabolism. I took what I considered to be and what Dr. Balfour characterised as a philosophical view of the whole problem, studying it from the angle of its periodicity (in your own words "seasonal appearance, subsidence, and recurrence"), its distribution throughout the world, and its occasional appearance in our asylums. I endeavoured to explain the enlargement of the parotid glands which is such a common feature of the disorder, and to account for the factor of heredity which is stressed by Harris. Now as I drew attention to the value of certain kinds of alcohol in the treatment, and in view of Miss Chick's remarks associating pellagra with alcoholism, perhaps I may be permitted to draw her attention to the list, in the article referred to above, of the various States in U.S.A. that were "wet" before the eighteenth amendment to the Constitution was passed in that country, and the percentage of their "wetness" prior to January, 1920. The figures were kindly supplied to me by the American consul in Cairo. In this connexion the use of the word alcohol is confusing. If Miss Chick refers to spirits, then I am in entire agreement. But light wines and beers are invaluable in the treatment of pellagra, because of the sugar they contain. Fruits are another excellent remedy for the same reason.

Briefly, my contention is that pellagra is a disease of metabolism, a disturbance of the sugar metabolism of the body, and that pellagrins are urgently in need of sugar, that very form of sugar (dextrose) which is being excreted so freely in the urine of diabetics.

I am, Sir, yours faithfully,

R. S. MILLER, M.D.

Chenies-street, W.C., August 15th, 1933.

PANEL AND CONTRACT PRACTICE

"Commercially Minded" or Shackled by Regulations

A FORTNIGHT ago "Candid Friend" suggested that the points raised under this heading in the previous week were trivial, and calculated to give a false impression of the conditions under which doctors work in the British insurance scheme. It is generally agreed that practice under panel regulations should be as similar as possible to those ruling in private practice. This is the ideal to be aimed at, but of course it is not so. It is made less so by such regulations as were responsible for the sense of injustice created by the items which "Candid Friend" finds trivial. It is quite true that a doctor in private may be taken into court on an unjustifiable charge, but he can use his defence society to protect him. It is quite a different matter to be summoned to a medical service subcommittee where he is allowed no expert help and has no redress against the person making the complaint. Some complaints may be justified and ought to be investigated, but in the case quoted the doctor did all that was humanly possible to carry out his obligations, and yet had to appear before the service subcommittee because he failed to find an insured person who had telephoned for a visit without adequately indicating the new address at which she was living. The negligence, if any, was entirely hers. He might have been killed in an accident for all she knew; she makes no attempt to find out why he did not come but is out for trouble straight away. If this sort of thing can happen under the regulations, then certainly the insurance doctor is definitely shackled.

On point (2), where the insured person obtains a new medical blank card, having still in his possession the old medical card with his doctor's name on it, "Candid Friend" seems to be wrong. The old doctor is certainly at risk all the time, because he will be the doctor sent for when attendance is necessary. Moreover, there will be no payment to him for that attendance, even if the attendance required was a definite emergency, because every panel doctor has to give necessary attendance to any insured person. He can only claim emergency pay if that person is on the list of another doctor who is not available at the time. It is quite true he is not bound to accept him on his list, but as these cases may be due to clerical error in an approved society's office, it would be a curious position for the doctor to take up to refuse to continue to have on his panel list a man who was removed from it through no fault of his own. Capitation fees will not have been paid to the doctor for possibly two or three years if the patient is of a healthy type, for it will not have been discovered that he was on no one's panel.

With regard to Clause 7 (3), "Candid Friend" says, "If the insurance committee think the patient has deliberately withheld from the doctor the fact that he is insured they will probably decide that he must pay the doctor himself." This is the crux of the complaint. Insurance committees do not always act on this basis, and it is becoming a common practice for patients to consult a doctor privately, obtain medicines (including containers) privately—even to state that they would have nothing to do with the panel, that they did not believe in it—and yet when the account is sent in Clause 7 (3) comes into play. The account must be withdrawn: 13 shillings or possibly a little more will be paid. These troubles do not arise with the poor patient who is usually quite straightforward about his status. Most of the trouble is with young people who consider themselves too good for panel treatment; they may not "demand" private treatment, but they indicate they expect it until they find it costs them money. Then they use Clause 7 (3) to avoid their obligations.

MEDICAL NEWS

Society of Apothecaries of London

At recent examinations the following candidates were successful :—

Surgery.—J. P. Fitzgerald, Guy's Hosp.; T. R. Hornby, Univ. of Manchester; E. Pugh-Jones and B. D. Sachdeva, Guy's Hosp.; A. L. L. Silver, London Hosp.; G. L. R. Tapsall, St. Mary's Hosp.; and G. Wilson, Guy's Hosp.

Medicine.—G. C. Canaval, Universities of Vienna and Bristol; R. F. Fleming, St. Mary's Hosp.; T. Gardner, Univ. of Leeds; A. E. Hassan, Univ. of Birmingham; G. McArd, Royal Free Hosp.; A. J. McGuire, Univ. of Manchester and Charing Cross Hosp.; P. J. Purcell, St. Mary's Hosp.; J. D. Taylor, Univ. of Manchester; A. W. Turner and J. C. Williams, St. Mary's Hosp.; and K. G. Wrigley, Univ. of Sheffield.

Forensic Medicine.—B. Anderson, Charing Cross Hosp.; A. C. E. Cole, Univ. of Cambridge and St. Mary's Hosp.; S. A. De Souza, St. Mary's Hosp.; R. Fleming, Univ. of Geneva and London Hosp.; G. W. Hardy, St. Mary's Hosp.; L. I. F. Kerridge, Univ. of Toronto and Royal Free Hosp.; J. Lipschitz, Westminster Hosp.; J. A. McClintock, King's College Hosp.; J. Richter, St. Mary's Hosp.; and T. F. Von Haebler, Univ. of Jena and Royal Free Hosp.

Midwifery.—W. H. Bayley, St. Thomas's Hosp.; G. C. Canaval, Universities of Vienna and Bristol; G. R. Greene, St. Mary's Hosp.; G. McArd, Royal Free Hosp.; D. Rocyn-Jones, Welsh National School of Medicine, Cardiff; T. F. Von Haebler, Univ. of Jena and Royal Free Hosp.; and J. E. S. Wright, Westminster Hosp.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery, and midwifery: T. R. Hornby, L. I. F. Kerridge, G. McArd, E. Pugh-Jones, P. J. Purcell, A. W. Turner, and J. C. Williams.

Dr. Wakelin Barrett has been elected Master of the Society in succession to Dr. Cecil Wall.

Chartered Society of Massage and Medical Gymnastics

Dr. W. J. O'Donovan, M.P., has accepted the presidency of the London branch of this society for the year 1934.

St. Thomas's Hospital Medical School

A post-graduate course will be held at this hospital from Monday, Sept. 25th, to Friday, Sept. 29th, and the old students' dinner will take place at the Dorchester Hotel, Park-lane, London, W., on Friday, Sept. 29th, at 7.15 for 7.45 P.M. Dr. Charles Box will be in the chair.

St. Mary's Hospital Medical School

The annual dinner of past and present students of this school will be held at the Trocadero Restaurant, Piccadilly, London, W., on Saturday, Sept. 30th, at 7.30 P.M., under the presidency of Dr. Reginald Miller. Further particulars may be had from the hon. secretary, Dr. A. Hope Gosse.

Post-graduate Course in Newcastle

Under the auspices of the University of Durham College of Medicine, Newcastle-upon-Tyne, a post-graduate course will be held from Sept. 11th to 22nd. There will be lectures and demonstrations daily from 9.30 A.M. to 4.0 P.M. from Mondays to Fridays, and they will all be given at the Royal Victoria Infirmary, except those on the Thursday afternoons when visits will be paid to the Princess Mary Maternity Hospital. The programme of the course may be had from the registrar of the College.

Post-graduate Course on Tuberculosis

Under the auspices of the Joint Tuberculosis Council a course of instruction on non-pulmonary tuberculosis will be given at Margate by Dr. B. W. Armstrong and Dr. J. G. Johnstone, medical superintendents of the Royal Sea-Bathing Hospital and Princess Mary's Hospital for Children respectively, from Oct. 9th to 14th. Particulars may be had from Dr. William Brand, 8, Highway-court, Beaconsfield, Bucks.

Journées Médicales de Bruxelles

The main subject for discussion at the next of these meetings, which will be held from June 23rd–27th, 1934, will be the clinical and surgical aspects of the physiopathology of the endocrine glands. Prof. Zunz (Brussels) will preside and Prof. Roussy (Paris) and Prof. de Quervain (Berne) have promised to take part. The secretary may be addressed at 141, rue Belliard, Brussels.

Fellowship of Medicine and Post-Graduate Medical Association

During the first part of September there will be an afternoon course in infants' diseases at the Infants Hospital, Vincent-square, S.W.1, which is especially intended for medical officers of welfare centres. At 11 A.M. on Tuesdays and Fridays throughout September there will be a course of lectures on psychological medicine, given at the Bethlem Royal Hospital, Beckenham, Kent. A fortnight's course in medicine, surgery, and the specialties will start on Sept. 18th at the Westminster Hospital, S.W.1. Further particulars may be had from the secretary of the association, 1, Wimpole-street, London, W.1.

Ruthin Castle Nurses' Home

Lord Derby last month opened the H. J. Scott nurses home at Ruthin Castle private hospital, North Wales. The cost has been defrayed to the extent of £10,000 by Mr. H. J. Scott, K.C., of Toronto; the late Sir Dorabiji and Lady Tata and Mr. Edward Meyerstein were also large contributors. The building is of brick, rough cast with limestone chippings from the local quarry; the mullions, doorways, and dressings are of the same red sandstone as the older part of Ruthin Castle, and the roof is of multi-coloured tiles.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.1.

MONDAY, Sept. 4th, to Saturday, Sept. 9th, 1933.—INFANTS HOSPITAL, Vincent-square, S.W. 1. Course in Diseases of Infants, afternoons only.—BETHLEM ROYAL HOSPITAL, Monk's Orchard, Eden Park, Beckenham. Course in P[illegible] Tuesday and Friday at 11 A.M. [illegible] ilable daily by special arrangemen[illegible] of Medicine.

Appointments

Certifying Surgeons under the Factory and Workshop Acts: CHURCHILL, H. M., M.R.C.S., L.R.C.P. Lond. (Islington District of the County of London); DENNING, F. A. V., L.R.C.P., L.R.C.S. Edin., L.R.F.P.S. Glasg. (Highworth, Wiltshire); FLETCHER, T., M.B., Ch.B. Glasg. (Troon, Ayr); WATSON, W. (Kirkcowan, Wigtown).

Vacancies

For further information refer to the advertisement columns

Birmingham, Royal Cripples Hospital.—H.S. At rate of £200.

Bolingbroke Hospital, Wandsworth Common.—Res. M.O. £200.

Bradford's Children's Hospital.—Hon. Asst. Physician.

Bristol General Hospital.—Sen. Res. M.O. £200.

Bucks County Council.—Deputy County M.O.H. and School M.O. £720.

Central London Throat, Nose and Ear Hospital, Gray's Inn-road, W.C.—Hon. Second Asst.

Chelmsford and Essex Hospital and Dispensary, London-road.—Res. M.O. £150.

Cobham, Surrey, Schiff Home of Recovery.—Res. Surg. O. At rate of £200.

Dreadnought Hospital, Greenwich, S.E.—H.P. and H.S. Each at rate of £110.

East Ham Memorial Hospital, Shrewsbury-road, E.—H.P. At rate of £150. Also H.S. to Special Depts., and Cas. O. Each at rate of £120.

Hampstead General and N.W. London Hospital, Haverstock Hill, N.W.—Cas. M.O. for Out-patient Dept. At rate of £100.

Hastings, Royal East Sussex Hospital.—Hon. Anæsthetists.

Leamington Spa, Warneford General Hospital.—Res. H.S. Also Res. Cas. H.S. and H.S. to Spec. Depts. Each at rate of £150.

Leicester Royal Infirmary.—H.S.'s, H.P.'s, and Cas. O.'s. Each at rate of £125.

Leigh Infirmary, Lancs.—Res. H.S. At rate of £175.

Liverpool, St. Paul's Eye Hospital, Old Hall-street.—H.S. At rate of £145.

London Homœopathic Hospital, Great Ormond-street, Bloomsbury, W.C.—Res. M.O. £100.

London Lock Hospital, Dean-street, Soho.—Res. M.O. At rate of £175.

Macclesfield General Infirmary.—Second H.S. At rate of £150.

Manchester Babies' Hospital, Burnage-lane, Levenshulme.—Sen. Res. M.O. At rate of £125.

Manchester Royal Children's Hospital, Gartside-street.—Two Asst. M.O.'s for Out-patients' Dept. Each at rate of £150.

Manchester, St. Mary's Hospital.—H.S. for Whitworth Park Hospital. At rate of £50.

Middlesex.—District M.O. £250.

Middlesex County Council.—Asst. M.O. £600.

Middlesex Hospital, W.—Asst. Radiologist. £150.

Newcastle-upon-Tyne, Hospital for Sick Children.—H.P., Sen. and Jun. H.S. Each at rate of £100.

Newport, Public Assistance Institution.—Sen. and Jun. M.O.'s. £350 and £150 respectively.

Northampton General Hospital.—H.P., Two H.S.'s, and H.S. to the Ear, Nose and Throat Dept. Each at rate of £150.

Norwich, Norfolk and Norwich Hospital.—Cas. O. and H.S. £120.

Nottingham City Mental Hospital.—Second Asst. M.O. £400.

Portsmouth Royal Hospital.—H.P. At rate of £130.

Princess Beatrice Hospital, Richmond-road, Earl's-court, S.W. Res. M.O. At rate of £110.

Queen's Hospital for Children, Hackney-road, E.—H.P., and Cas. O. Each at rate of £100.

Radium Institute, Riding House-street, W.—Res. Surg. Reg. At rate of £250.

Royal Chest Hospital, City-road, E.C.—Physician to Out-patients.

Royal National Orthopædic Hospital, 234 Gt. Portland-street, W.—Two H.S.'s. Each at rate of £150.

Royal Northern Hospital, Holloway, N.—H.S. At rate of £70.

St. Peter's Hospital for Stone, Henrietta-street, W.C.—H.S. At rate of £75.

Salford Royal Hospital.—H.P., Two H.S.'s, and Cas. H.S. Each at rate of £125.

Salisbury General Infirmary.—H.S. At rate of £150.

Scarborough Hospital and Dispensary.—Two H.S.'s. Each at rate of £175.

Sheffield Royal Infirmary.—Clin. Asst. to the Dermatological Dept. £300.

South Eastern Hospital for Children, Sydenham, S.E.—Jun. Res. M.O. At rate of £120.

Stepney Metropolitan Borough.—Deputy M.O.H. £720.

Walsall, Manor Hospital.—Jun. Res. Asst. M.O. £150.

West London Hospital, Hammersmith-road, W.—H.P., H.S. Also H.S. to Throat, Nose and Ear Dept. Each at rate of £100.

Westminster Hospital, Broad Sanctuary, S.W.—Hon. Anæsthetist.

West Riding County Council.—School Oculist. £600.

Willesden General Hospital, Harlesden-road, N.W.—Cas. O. At rate of £100.

Winchester, Royal Hampshire County Hospital.—H.P. At rate of £125.

Births, Marriages, and Deaths

BIRTHS

MOYNIHAN.—On August 23rd, at Ashwell, Hertford, the wife (Sheila, M.R.C.S. Eng., L.R.C.P. Lond.) of J. H. Moynihan, M.R.C.S. Eng., L.R.C.P. Lond., of a son.

RAVEN.—On August 26th, at Victoria-parade, Broadstairs, the wife of Martin Owen Raven, M.D. Oxf., M.R.C.P. Lond., of a son.

DEATHS

HODGSON.—On August 13th, suddenly, at Sydney, N.S.W., Harold West Hodgson, M.C., M.R.C.S. Eng., L.R.C.P. Lond., aged 57 years, late of Maghull, Liverpool.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

THIS DREAD OF GHOSTS

Fear of the dead is as ancient as civilisation, and most people have wondered, more or less casually, how it arose. Miss M. E. Durham, in an address published in *Folk Lore* (June, 1933), suggests a plausible explanation, and argues it convincingly. She starts with the unusual assumption that primitive man was no fool, referring us to his well-developed brain, his rock paintings and carvings, and his skill in hunting, as evidence of his inventive power and imagination. Fear of the dead, she believes, was man's first tentative recognition of infectious disease. "It is the way of ghosts all the world over," Sir James Frazer says, ". . . to make themselves exceedingly disagreeable, especially to their near relatives."

It must have been recognised early, as Miss Durham points out, that after a death other members of a man's family often died too. The rest of the tribe were not so far wide of the mark if they blamed the dead man for these secondary deaths. Nor would it be difficult, in the panic of an epidemic, to imagine that the dead man walked among them. She tells the story of an outbreak of typhoid, as recently as 30 years ago, in a village in Bosnia; the widow of the first victim declared that her husband had returned in the night and sucked her blood, and subsequently she too died—of typhoid. The villagers were convinced that a vampire was in their midst, many of them saw the dead man and had their blood sucked by him in the night, and several more died before the epidemic was arrested. Here was a modern example of the ghost returning to injure his relatives.

Primitive man had no means of knowing which corpses were infectious and likely to cause further deaths, so he sensibly regarded them all as dangerous and took steps to render them harmless. And Miss Durham points out how sound these measures often were. Those who had handled the corpse were regarded as unclean, and were often kept in strict isolation or taboo for a given period afterwards; in many places they were required to bathe in the sea or in running water. Sometimes the body was ferried across a river to the burial ground. Running water is an effective barrier to ghosts and witches—a point which is memorably illustrated in Robert Burns's "Cutty Sark." It is also a pretty good barrier to the spread of infection, and a tribe on one side of a river may be dying of small-pox while that on the other bank remain healthy, until, as Miss Durham puts it, "some poor wretch paddles across on a raft in search of food and—the deadly ghost goes with him." Among the Papuans of Gevink Bay the family of the dead person go in state to a sacred place to purify themselves by bathing, the journey being made by sea; a period of quarantine is followed in this way by disinfection. In other places the water-butt is emptied, lest the ghost should lurk in the water, and sometimes a fresh door is made to the house, that through which the corpse was carried being sealed up. Then there were customs of burning the body, and often the utensils and weapons of the dead man; and in some parts of the world ghosts and evil spirits are driven out by sweeping. Mourning garments, Miss Durham thinks, are a warning to protect others from being haunted—or infected.

She believes that a good deal of ritual represents degenerated medical prescriptions, but a sound practice hit upon, as she says, by an able mind, might be misused and distorted until it degenerated into apparently meaningless ritual; ceremonial washing became perfunctory and the sweeping away of dust after removal of the body a mere symbolic gesture. It is interesting to consider further why such degeneration should have occurred; she attributes it to misuse by the ignorant, but it might equally be due to the scepticism of the intelligent. The more observant members of the tribe would notice that the protective measures advocated were not always successful. In spite of fulfilling every detail of the prescribed ritual, in some cases the family of the dead man were attacked and slain by the ghost. Primitive man had no statistics to demonstrate that the results were, on the whole, probably better among those who attended most strictly to purification rites. He did not know that he was fighting microscopic organisms, consequently his aseptic precautions were necessarily clumsy and incomplete. With so many loopholes in his defences, small wonder if he became disheartened and perfunctory in his performance of ritual. It is not too far fetched, perhaps, to apply the same moral to our own day. Failure to achieve certain success in every case treated with a given method may lead to slovenly technique even now, when we can no longer attribute disaster to the incalculable behaviour of a ghost. An example is to be found in the refusal of many practitioners to wear a mask for midwifery, on the ground that this measure does not certainly exclude the danger of puerperal sepsis. Perhaps we have not much right, after all, to patronise the superstitions of primitive man. As Miss Durham says: "He fumbled in the dark to fight the unseen foes and . . . it is *greatly to his credit* that some of the methods he lighted upon are proved to be correct by modern science and are still in use."

SHACK-DWELLERS AND PUBLIC HEALTH

Wooden dwellings were pulled down last week at Laneburn Bungalow Colony, near Ashington, by order of the Newbiggin urban district council under the Public Health (Amendment) Act, 1907. One family moved out on request; four families were ejected by bailiffs who thereupon proceeded to demolish the dwellings in the presence of police; thirty families in all have been ordered to leave. Complaints had been received of the insanitary state of this colony on the Northumberland moors. It has no facilities for sewerage or removal of refuse, and local wells and springs formed its only water-supply. Life in camps and colonies of this type not only raises questions of regulation and amenities such as were dealt with in the Surrey County Council Act lately; it also has an important public health aspect, and Parliament may soon be asked to deal generally with this subject.

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NOTES, COMMENTS, AND ABSTRACTS

THIS DREAD OF GHOSTS

FEAR of the dead is as ancient as civilisation, and most people have wondered, more or less casually, how it arose. Miss M. E. Durham, in an address published in *Folk Lore* (June, 1933), suggests a plausible explanation, and argues it convincingly. She starts with the unusual assumption that primitive man was no fool, referring us to his well-developed brain, his rock paintings and carvings, and his skill in hunting, as evidence of his inventive power and imagination. Fear of the dead, she believes, was man's first tentative recognition of infectious disease. "It is the way of ghosts all the world over," Sir James Frazer says, ". . . to make themselves exceedingly disagreeable, especially to their near relatives."

It must have been recognised early, as Miss Durham points out, that after a death other members of a man's family often died too. The rest of the tribe were not so far wide of the mark if they blamed the dead man for these secondary deaths. Nor would it be difficult, in the panic of an epidemic, to imagine that the dead man walked among them. She tells the story of an outbreak of typhoid, as recently as 30 years ago, in a village in Bosnia; the widow of the first victim declared that her husband had returned in the night and sucked her blood, and subsequently she too died—of typhoid. The villagers were convinced that a vampire was in their midst, many of them saw the dead man and had their blood sucked by him in the night, and several more died before the epidemic was arrested. Here was a modern example of the ghost returning to injure his relatives.

Primitive man had no means of knowing which corpses were infectious and likely to cause further deaths, so he sensibly regarded them all as dangerous and took steps to render them harmless. And Miss Durham points out how sound these measures often were. Those who had handled the corpse were regarded as unclean, and were often kept in strict isolation or taboo for a given period afterwards; in many places they were required to bathe in the sea or in running water. Sometimes the body was ferried across a river to the burial ground. Running water is an effective barrier to ghosts and witches—a point which is memorably illustrated in Robert Burns's "Cutty Sark." It is also a pretty good barrier to the spread of infection, and a tribe on one side of a river may be dying of small-pox while that on the other bank remain healthy, until, as Miss Durham puts it, "some poor wretch paddles across on a raft in search of food and—the deadly ghost goes with him." Among the Papuans of Gevink Bay the family of the dead person go in state to a sacred place to purify themselves by bathing, the journey being made by sea; a period of quarantine is followed in this way by disinfection. In other places the water-butt is emptied, lest the ghost should lurk in the water, and sometimes a fresh door is made to the house, that through which the corpse was carried being sealed up. Then there were customs of burning the body, and often the utensils and weapons of the dead man; and in some parts of the world ghosts and evil spirits are driven out by sweeping. Mourning garments, Miss Durham thinks, are a warning to protect others from being haunted—or infected.

She believes that a good deal of ritual represents degenerated medical prescriptions, but a sound practice hit upon, as she says, by an able mind, might be misused and distorted until it degenerated into apparently meaningless ritual; ceremonial washing became perfunctory and the sweeping away of dust after removal of the body a mere symbolic gesture. It is interesting to consider further why such degeneration should have occurred; she attributes it to misuse by the ignorant, but it might equally be due to the scepticism of the intelligent. The more observant members of the tribe would notice that the protective measures advocated were not always successful. In spite of fulfilling every detail of the prescribed ritual, in some cases the family of the dead man were attacked and slain by the ghost. Primitive man had no statistics to demonstrate that the results were, on the whole, probably better among those who attended most strictly to purification rites. He did not know that he was fighting microscopic organisms, consequently his aseptic precautions were necessarily clumsy and incomplete. With so many loopholes in his defences, small wonder if he became disheartened and perfunctory in his performance of ritual. It is not too far fetched, perhaps, to apply the same moral to our own day. Failure to achieve certain success in every case treated with a given method may lead to slovenly technique even now, when we can no longer attribute disaster to the incalculable behaviour of a ghost. An example is to be found in the refusal of many practitioners to wear a mask for midwifery, on the ground that this measure does not certainly exclude the danger of puerperal sepsis. Perhaps we have not much right, after all, to patronise the superstitions of primitive man. As Miss Durham says: "He fumbled in the dark to fight the unseen foes and . . . it is *greatly to his credit* that some of the methods he lighted upon are proved to be correct by modern science and are still in use."

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both gold or silver rings form a spiral groove in the endometrium with which they come in contact; the adjacent cells become irregularly shaped or flattened, and the uterine glands tend to atrophy or disappear. These changes are usually of the nature of a local pressure atrophy. In the light of what is known about the carcinogenic action of prolonged subacute irritation, it would clearly be premature to assert that the insertion of foreign bodies into the uterus is entirely safe. Carleton and Phelps are careful to acknowledge that experiments on rabbits do not necessarily apply to human beings, but their findings are, nevertheless, suggestive.

MEDICINAL CHARCOAL

CARBO LIGNI no longer finds a place in the British Pharmacopœia, and its omission is probably a true reflection of the opinion of most practitioners in this country. But a paper by G. H. W. Lucas and V. E. Henderson[1] of Toronto may do something to reinstate it in therapeutics.

Charcoal owes its effect to its physical properties as an adsorbing agent, and has accordingly been prescribed for dyspepsia associated with flatulence. It is of course a mere palliative, but as a harmless remedy in cases of this kind, it has long enjoyed a considerable reputation among the lay public. Another of its uses less widely appreciated is in cases of poisoning. When it has been decided that the stomach shall be washed out, there is usually a delay of at least a few minutes, and at this time there is much to be said for giving charcoal as a preliminary. Henderson and Lucas cite the clinical experience of Adler, who used "an excellent medicinal charcoal" in 50 cases of poisoning. "In 21 cases where death would presumably have occurred, the administration of charcoal saved the patient." Phosphorus, morphine, corrosive sublimate, potassium chlorate, lysol, arsenic, veronal, and absinthe were among the poisons which had been taken. Experiments in the laboratory have shown that comparatively large amounts of toxic substances can be adsorbed by charcoal; thus it is said that a single teaspoonful of charcoal will adsorb about six times the minimal lethal dose of strychnine. Henderson and Lucas also comment on the "remarkable results recorded of the use of charcoal in Asiatic cholera, dysentery, diarrhœa, and dyspepsia."

It is noteworthy that much variation was found in the quality of the charcoals studied, and not the least valuable result of this work has been to ensure that carbo medicinalis of the Canadian formulary is really potent.

THE BLOOD PRESSURE AFTER OPERATION

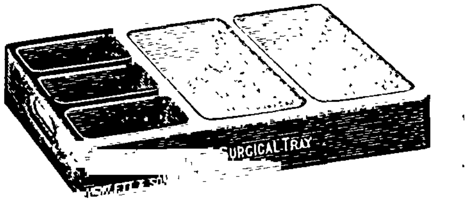
THE post-operative behaviour of the blood-pressure has hitherto attracted no particular attention. Carl Semb and Atle Berg,[2] working at the Ullevaal Hospital, have made a systematic investigation in 134 cases. The patients chosen were preferably young and otherwise healthy subjects undergoing commonplace operations. A few more complicated cases in elderly and unhealthy patients were also investigated. Comparisons between day-pressures and night-pressures were carried out in 45 cases, the night-pressures being measured under uniform conditions when the patients were asleep. Semb and Berg found that the blood-pressure after operations tends to rise. This rise is more constantly noted in the night-pressure than in the day-pressure. Hence, in the post-operative state, there is an abnormal relationship between the day- and night-pressures. Owing to the diminished, or absent, fall of blood-pressure at night, the cardio-vascular system does not secure the rest provided under normal physiological conditions. A similar phenomenon has been observed in decompensated heart disease and also in diphtheria, whence the authors of this monograph conclude that it is evidence of circulatory disturbance, with venous stasis occurring in the systemic circulation, and especially in the splanchnic area. This venous stasis may eventually be the cause of the post-operative blood-pressure changes. Cases without pre-operative complications showed a greater tendency to post-operative rise of blood-pressure. Rises of pressure, especially at night, occurred more or less parallel with post-operative intestinal disturbances—e.g., meteorism, mechanical and paralytic ileus. Semb and Berg observed no pathological fall of blood-pressure in cases of thrombosis and embolism, thus differing from other workers in this field.

The results of this small investigation are, of course, not final, but they are of some academic interest. Moreover, they are of sufficient practical importance to warrant further research on these lines into the cause and prevention of post-operative embolism.

HOSPITAL FLOORING

DR. J. F. BRISCOE (Newcastle-on-Tyne) writes: "The Americans are nothing if not thorough in their endeavour to reach the ideal standard. In visiting a large number of hospitals and other institutions, notably those of the United States, I came across a unique flooring in an institution at Newport News, Virginia, consisting of square sections of a soft resilient composition material, placed centrally along the passages. It is washable, covers the flooring to within a foot of the passage walls, and is quite silent to the footstep. No polishing is needed, it rarely warps, cracks, or fissures; and each square, 9 × 7 in., is easily removed and replaced by a new one. I entered the adjoining cubicles, containing steel furniture, and with closed doors convinced myself of the noiselessness of this flooring."

A NEW SURGICAL TRAY.—Messrs. C. J. Hewlett and Son, Ltd. (Charlotte-street, London, E.C. 2), have brought out a new surgical tray which for general clinical work should prove useful. As will be seen from the illustration moulded partitions of porcelain divide the tray into five compartments, the larger being useful for instruments and certain dressings, and the less capacious for surgical needles and similar small objects. Should the disinfecting solution become cloudy, and the instruments thus be obscured, they are easily recovered, as the sloping sides of the tray cause them to fall to the bottom. The tray, which is made of white porcelain, 16 by 12 by 2½ in., has rounded corners, is easily washed and sterilised, and can be used for both wet and dry dressings. The sunk handles allow of easy and safe carrying.



A NEW BOTTLE-TEAT.—Cow and Gate Ltd., Guildford, has placed on the market a teat designed to meet natural requirements and secure the inflow of milk by the same muscular action as in breast-feeding. The teat is broad and flat at the base, and has been moulded from a healthy teat, and the insertion of a valve between it and the bottle governs the flow of milk and ensures that it is only removed by munching action, sucking giving negative results. The infant consequently behaves in feeding with the bottle as it would do if feeding on the breast. The intention is to prevent the damage to the shape and contour of the bones of the mouth which has been attributed to artificial feeding.

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[1] Canad. Med. Assoc. Jour., July, 1933, p. 22.
[2] Acta. chir. Scand., 1933, vol. lxxiii., suppl. xxvi.

ADDRESSES AND ORIGINAL ARTICLES

CHEMICAL ORGANISATION IN THE LIVING CELL*

By Sir Gowland Hopkins, D.Sc., F.R.C.P. Lond.

PROFESSOR OF BIOCHEMISTRY IN THE UNIVERSITY OF CAMBRIDGE; PRESIDENT OF THE ROYAL SOCIETY

It is surely at that level of organisation, which is based on the exact coördination of a multitude of chemical events within it, that a living cell displays its peculiar sensitiveness to the influence of molecules of special nature when these enter it from without. The nature of very many organic molecules is such that they may enter a cell and exert no effect. Those proper to metabolism follow, of course, the normal paths of change. Some few, on the other hand, influence the cell in very special ways. When such influence is highly specific in kind it means that some element of structure in the entrant molecule is adjusted to meet an aspect of molecular structure somewhere in the cell itself. We can easily understand that in a system so minute the intrusion even of a few such molecules may so modify existing equilibria as to affect profoundly the observed behaviour of the cell.

RÔLE OF THE NERVOUS SYSTEM

Such relations, though by no means confined to them, reach their greatest significance in the higher organisms, in which individual tissues, chemically diverse, differentiated in function and separated in space, so react upon one another through chemical agencies transmitted through the circulation as to coördinate by chemical transport the activities of the body as a whole. Unification by chemical means must to-day be recognised as a fundamental aspect of all such organisms. In all of them it is true that the nervous system has pride of place as the highest seat of organising influence, but we know to-day that even this influence is often, if not always, exerted through properties inherent in chemical molecules. It is indeed most significant for my general theme to realise that when a nerve impulse reaches a tissue the sudden production of a definite chemical substance at the nerve-ending may be essential to the response of that tissue to the impulse. It is a familiar circumstance that when an impulse passes to the heart by way of the vagus nerve-fibres the beat is slowed, or, by a stronger impulse, arrested. That is, of course, part of the normal control of the heart's action. Now it has been shown that whenever the heart receives vagus impulses the substance acetyl choline is liberated within the organ. To this fact is added the further fact that, in the absence of the vagus influence, the artificial injection of minute graded doses of acetyl choline so acts upon the heart as to reproduce in every detail the effects of graded stimulation of the nerve. Moreover, evidence is accumulating to show that in the case of other nerves belonging to the same morphological group as the vagus, but supplying other tissues, this same liberation of acetyl choline accompanies activity, and the chemical action of this substance upon such tissues again produces effects identical with those observed when the nerves are stimulated. More may be claimed. The functions of another group of nerves are opposed to those of the vagus group; impulses, for instance, through certain fibres accelerate the heart-beat. Again a chemical substance is liberated at the endings of such nerves, and this substance has itself the property of accelerating the heart. We find then that such organs and tissues respond only indirectly to whatever non-specific physical change may reach the nerve-ending. Their direct response is to the influence of particular molecules with an essential structure when these intrude into their chemical machinery.

It follows that the effect of a given nerve stimulus may not be confined to the tissue which it first reaches. There may be humoral transmissions of its effect, because the liberated substance enters the lymph and blood. This again may assist the coördination of events in the tissues.

CHEMICAL MESSENGERS

From substances produced temporarily and locally and by virtue of their chemical properties translating for the tissues the messages of nerves, we may pass logically to consideration of those active substances which carry chemical messages from organ to organ. Such in the animal body are produced continuously in specialised organs, and each has its special seat or seats of action where it finds chemical structures adjusted in some sense or other to its own.

I shall be here on familiar ground, for that such agencies exist, and bear the name of hormones, is common knowledge. I propose only to indicate how many and diverse are their functions as revealed by recent research, emphasising the fact that each one is a definite and relatively simple substance with properties that are primarily chemical and in a derivate sense physiological. Our clear recognition of this, based at first on a couple of instances, began with this century, but our knowledge of their number and nature is still growing rapidly to-day.

We have long known, of course, how essential and profound is the influence of the thyroid gland in maintaining harmonious growth in the body, and in controlling the rate of its metabolism. Three years ago a brilliant investigation revealed the exact molecular structure of the substance—thyroxin—which is directly responsible for these effects. It is a substance of no great complexity. The constitution of adrenaline has been longer known and likewise its remarkable influence in maintaining a number of important physiological adjustments. Yet it is again a relatively simple substance. I will merely remind you of secretin, the first of these substances to receive the name of hormone, and of insulin, now so familiar because of its importance in the metabolism of carbohydrates and its consequent value in the treatment of diabetes. The most recent growth of knowledge in this field has dealt with hormones which, in most remarkable relations, coördinate the phenomena of sex.

It is the circulation of definite chemical substances produced locally that determines during the growth of the individual the proper development of all the secondary sexual characters. The properties of other substances secure the due progress of individual development from the unfertilised ovum to the end of fœtal life. When an ovum ripens and is discharged from the ovary a substance, now known as œstrin, is produced in the ovary itself, and so functions as to bring about all those changes in the female body which make secure the fertilisation of the ovum. On the discharge of the ovum new tissue, constituting the so-called corpus luteum, arises in its place. This then produces a special hormone which in its turn evokes all those changes in tissues and organs that secure a right destiny for the ovum after it has been fertilised. It is clear that these two hormones do not arise simultaneously, for they must act in alternation, and it becomes of great interest to know how such succession is secured. The facts here are among the most striking. Just as higher nerve-centres in the brain control and coördinate the activities of lower centres, so it would seem do hormones, functioning at, so to speak, a higher level in organisation, coördinate the activities of other hormones. It is a substance produced in the anterior portion of the pituitary gland situated at the base of the brain, which by circulating to the ovary controls the succession of its hormonal activities. The cases I have mentioned are far from exhausting the numerous hormonal influences now recognised.

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* Part of the presidential address, entitled Some Chemical Aspects of Life, given to the British Association at Leicester on Sept. 6th, 1933.

HORMONES AND VITAMINS

For full appreciation of the extent to which chemical substances control and coördinate events in the animal body by virtue of their specific molecular structure, it is well not to separate too widely in thought the functions of hormones from those of vitamins. Together they form a large group of substances of which every one exerts upon physiological events its own indispensable chemical influence.

Hormones are produced in the body itself, while vitamins must be supplied in the diet. Such a distinction is, in general, justified. We meet occasionally, however, an animal species able to dispense with an external supply of this or that vitamin. Evidence shows, however, that individuals of that species, unlike most animals, can in the course of their metabolism synthesise for themselves the vitamin in question. The vitamin then becomes a hormone. In practice the distinction may be of great importance, but for an understanding of metabolism the functions of these substances are of more significance than their origin.

The present activity of research in the field of vitamins is prodigious. The output of published papers dealing with original investigations in the field has reached nearly a thousand in a single year. Each of the vitamins at present known is receiving the attention of numerous observers in respect both of its chemical and biological properties, and though many publications deal, of course, with matters of detail, the accumulation of significant facts is growing fast.

It is clear that I can cover but little ground in any reference to this wide field of knowledge. Some aspects of its development have been interesting enough. The familiar circumstance that attention was drawn to the existence of one vitamin (B_1 so called) because populations in the East took to eating milled rice instead of the whole grain; the gradual growth of evidence which links the physiological activities of another vitamin (D) with the influence of solar radiation on the body, and has shown that they are thus related, because rays of definite wave-length convert an inactive precursor into the active vitamin, alike when acting on foodstuffs or on the surface of the living body; the fact again that the recent isolation of vitamin C, and the accumulation of evidence for its nature started from the observation that the cortex of the adrenal gland displayed strongly reducing properties; or yet again the proof that a yellow pigment widely distributed among plants, while not the vitamin itself, can be converted within the body into vitamin A; these and other aspects of vitamin studies will stand out as interesting chapters in the story of scientific investigation.

AUXINS

In this very brief discussion of hormones and vitamins I have so far referred only to their functions as manifested in the animal body. Kindred substances, exerting analogous functions, are, however, of wide and perhaps of quite general biological importance. It is certain that many micro-organisms require a supply of vitamin-like substances for the promotion of growth, and recent research of a very interesting kind has demonstrated in the higher plants the existence of specific substances produced in special cells which stimulate growth in other cells, and so in the plant as a whole. These so-called auxins are essentially hormones.

It is of particular importance to my present theme and a source of much satisfaction to know that our knowledge of the actual molecular structure of hormones and vitamins is growing fast. We have already exact knowledge of the kind in respect to not a few. We are indeed justified in believing that within a few years such knowledge will be extensive enough to allow a wide view of the correlation between molecular structure and physiological activity. Such correlation has long been sought in the case of drugs, and some generalisations have been demonstrated. It should be remembered, however, that until quite lately only the structure of the drug could be considered. With increasing knowledge of the tissue structures pharmacological as well as hormonal actions will become much clearer.

A SYSTEM OF CONDENSED RINGS

I cannot refrain from mentioning here a set of relations connected especially with the phenomena of tissue growth which are of particular interest. It will be convenient to introduce some technical chemical considerations in describing them, though I think the relations may be clear without emphasis being placed on such details. The vitamin, which in current usage is labelled "A," is essential for the general growth of an animal. Recent research has provided much information as to its chemical nature. Its molecule is built up of units which possess what is known to chemists as the isoprene structure. These are condensed in a long carbon chain which is attached to a ring structure of a specific kind. Such a constitution relates it to other biological compounds, in particular to certain vegetable pigments, one of which a carotene, so called, is the substance which I have mentioned as being convertible into the vitamin. For the display of an influence upon growth, however, the exact details of the vitamin's proper structure must be established. Now turning to vitamin D, of which the activity is more specialised, controlling as it does the growth of bone in particular, we have learnt that the unit elements in its structure are again isoprene radicals; but instead of forming a long chain as in vitamin A they are united into a system of condensed rings. Similar rings form the basal component of the molecules of sterols, substances which are normal constituents of nearly every living cell. It is one of these, inactive itself, which ultra-violet radiation converts into vitamin D. We know that as stated each of these vitamins stimulates growth in tissue cells. Next consider another case of growth stimulation, different because pathological in nature. As you are doubtless aware, it is well known that long contact with tar induces a cancerous growth of the skin. Very important researches have recently shown that particular constituents in the tar are alone concerned in producing this effect. It is being further demonstrated that the power to produce cancer is associated with a special type of molecular structure in these constituents. This structure, like that of the sterols, is one of condensed rings, the essential difference being that (in chemical language) the sterol rings are hydrogenated, whereas those in the cancer-producing molecules are not. Hydrogenation indeed destroys the activity of the latter. Recall, however, the ovarian hormone œstrin. Now the molecular structure of œstrin has the essential ring structure of a sterol, but one of the constituent rings is not hydrogenated. In a sense therefore the chemical nature of œstrin links vitamin D with that of cancer-producing substances. Further, it is found that substances with pronounced cancer-producing powers may produce effects in the body like those of œstrin. It is difficult when faced with such relations not to wonder whether the metabolism of sterols, which when normal can produce a substance stimulating physiological growth, may in very special circumstances be so perverted as to produce within living cells a substance stimulating pathological growth. Such a suggestion must, however, with present knowledge, be very cautiously received. It is wholly without experimental proof. My chief purpose in this reference to this very interesting set of relations is to emphasise once more the significance of chemical structure in the field of biological events.

Only the end-results of the profound influence which minute amounts of substances with adjusted structure exert upon living cells or tissues can be observed in the intact bodies of man or animals. It is doubtless because of the elaborate and sensitive organisation of chemical events in every tissue cell that the effects are proportionally so great.

THE MECHANISM

It is an immediate task of biochemistry to explore the mechanism of such activities. It must learn to describe in objective chemical terms precisely how and where such molecules as those of hormones and vitamins intrude into the chemical events of metabolism. It is indeed now beginning this task which is by no means outside the scope of its methods. Efforts of this and of similar kind cannot fail to be associated with a steady increase in knowledge of the whole field of chemical organisation in living organisms, and to this increase we look forward with confidence. The promise is there. Present methods can still go far, but I am convinced that progress of the kind is about to gain great impetus from the application of those new methods of research which chemistry is inheriting from physics: X ray analysis; the current studies of unimolecular surface films and of chemical reactions at surfaces; modern spectroscopy; the quantitative developments of photochemistry; no branch of inquiry stands to gain more from such advances in technique than does biochemistry at its present stage. Especially is this true in the case of the colloidal structure of living systems.

A "FRESH AIR HOME."—Lord Howard of Penrith recently formally opened a Fresh Air Fortnight Home at Allonby, Cumberland, which has been given by Mrs. Robinson-Harrison. The home will be open for ten months every year and will receive for a fortnight at a time poor children between the ages of 4 and 5 from Carlisle, Penrith, and West Cumberland, chosen by the county medical officer. The building, which holds six boys and six girls, faces the sea, with views of the Scottish hills and the Lake district.

ORAL CANCER IN BETEL NUT CHEWERS IN TRAVANCORE

ITS ÆTIOLOGY, PATHOLOGY, AND TREATMENT

By Ian Morison Orr, M.B. Glasg.

SURGEON TO THE NEYOOR HOSPITAL (LONDON MISSIONARY SOCIETY), SOUTH TRAVANCORE, INDIA

One of the most prevalent and most serious diseases of Travancore is oral cancer, which takes the form of an epithelioma involving the cheek, lower alveolus or lip, and occasionally the palate or tongue. At the Neyoor Hospital during the last five years 669 cases have been treated by radium, diathermy, or operation, and the situation of the growths was:—

Cheek	296	Upper jaw	41
Lower jaw	196	Lip	40
Tongue	96		
			669

The prevalent opinion is that the disease is due to the habit of chewing betel, but while this habit is widespread throughout India among all classes, a geographical survey has shown that oral cancer is common only in the south-west coast—viz., Malabar, Cochin and Travancore, and Ceylon. As this hospital treats the vast majority of the cases of oral cancer in the southern 200 miles of the west coast the findings here recorded may be taken as representative of the area as a whole. A localised questionnaire in Travancore itself revealed that the heaviest incidence of the disease was in the southern half of the State, in the coastal villages and plains, and that it was almost unknown in the hill districts or among the coolies of the tea plantations. Accurate statistical evidence is almost impossible to obtain, since hospital records and death registers are not maintained with the same accuracy as in European countries.

The following questions have been investigated by the questionnaire method:—

(1) Is there a definite geographical distribution?

(2) Is the disease definitely associated with the betel chewing habit; if so, what are the carcinogenetic factors in the quid?

(3) Is it associated with syphilis?

(4) Is it associated with any particular dietetic or nutritional defect?

The following aspects have been investigated by direct observation of a series of 100 individual cases, by experiment and histological investigation.

(1) The social position, sex, age, environment, site of growth, habits, family history, onset, and development in individual cases.

(2) The effects of chewing on the physiological processes: digestive system, nervous system, and general health.

(3) The incidence of syphilis in cancerous and non-cancerous cases.

(4) The macroscopic appearance of the ulcers and their lines of progression and the histological changes, particular note being made of precancerous changes and the transition to the fully developed cancerous stage.

(5) Treatment of the precancerous condition and the established disease.

Characteristics and Incidence

Site of Growth.—Of the 100 cases under particular examination the following were the sites of the ulcer, in order of frequency:—

(1) Lower alveolus and the sulcus between the alveolus and cheek	34
(2) The cheek only	33
(3) Tongue and floor of mouth	15
(4) Upper jaw and palate	10
(5) Lip	8 = 100

It is seen therefore that in 67 of the cases the growth involved the site irritated directly by the quid of betel. While almost none of the cases would admit that they kept the quid persistently in the cheek, they all confessed to using one side more than the other. In the 8 lip cases the ulcer commenced just inside the angle of the mouth and spread on to the lip, and in many of the cheek cases the angle of the mouth was affected as well. This apparently is due to the habit of squirting out the juice through the corner of the mouth. While the tongue and palate cases could not be directly attributed to the irritation of the quid, the juice constantly circulating in the mouth bathes these parts and may render them more sensitive to additional trauma such as rough and septic teeth.

Onset and Early History.—Forty-nine of the patients said that for many years they had had a burning sensation in the mouth on taking hot foods; some confessed to noticing an area of chronic inflammation in the cheek, others to noticing white patches. (As most of the patients were of the lower orders and not observant by nature the early history was rarely clear and satisfactory.) The earliest observed change which showed signs on section of going carcinomatous was a small reddish patch of chronic inflammation on the cheek, and numerous sections made from leucoplakic patches were very suggestive of commencing malignant disease.

It was not uncommon to find one main growth with one or two small ulcerations or papillomas in distant parts of the mouth. In several cases of cancer of the lower jaw one or two small early patches were found on the palate. On section these showed early malignant change. According to Moynihan[1] this is extremely rare, but examples have been reported, and Oldham, who quotes two cases, makes the suggestion that these are implantations from the primary site. This is in accordance with my own observations.

The age- and sex-incidence was as follows:—

	Cases.	Sex.	
Under 30	4	Males	83 per cent.
30–40	16	Females	17 „ „
40–50	44		
Over 50	36		
	100		

Caste and Social Status.—While examples were found in all communities, the vast majority were from the lower orders, where dirty habits and malnutrition prevail.

Relationship to Syphilis.—Wassermann reactions were investigated in 100 cases and 12 per cent. were positive. This percentage is no more than might be found among any group of patients taken at random. The statistics of the Madras General Hospital in this connexion are interesting.

W.R. positive among oral cancer cases, 5 per cent.
„ „ „ general cases, 4·5 per cent.

In my series the positive Wassermanns were found as follows: lip, 8; lip and cheek, 3; and tongue, 1. None of these with positive reactions were heavy betel chewers.

Distribution of the Disease in India

A questionnaire was sent extensively to government and mission hospitals throughout India inquiring upon the following points:

Is oral cancer common?
Is betel chewing common?
What are the substances used in the quid, and from what sources are they derived?

Several minor questions regarding the incidence of syphilis and the frequency of leucoplakia were also asked, and will be dealt with later in this report. While the returns were not altogether complete they were sufficiently consistent to draw the following conclusions:—

(1) (*a*) Oral cancer is very common on the Malabar coast, Travancore, and Ceylon. (Fig. 1.) (*b*) It is also found in the Tinnevelly district and to a less extent in Madura district. (*c*) It is rare in other parts of India.

(2) The betel habit is almost universal throughout India, and is just as common in the non-oral cancer areas as in the west coast.

(3) The substances used in the quid are similar in essentials except in two important factors: (*a*) shell lime is used in the west coast and stone lime in all other parts of India; (*b*) the type of tobacco is peculiar to Travancore and Ceylon. (Fig. 2.)

A second questionnaire confined to the government district hospitals in Travancore revealed a further point of interest. The disease is most common in the towns and villages along the coast, and is little known to the medical officers in the tea estates in the hills of Travancore where 100,000 coolies work. I would put the incidence of oral cancer in the tea estates at 1 in 50,000 of the adult population per annum. In the coastal villages the incidence is roughly 1 in 5000 of the adult population per annum.

It might be well perhaps at this point to discuss the reason for the localisation of the disease to the south-west coast and Ceylon. The possible factors in order of importance are: the ingredients of the quid; the habits of the people; nutritional differences and intercurrent disease.

INGREDIENTS OF THE QUID

The Lime.—In Malabar, Travancore, and part of Ceylon the lime is derived from the shell, in all other parts of India stone lime is used. There is little doubt that the shell lime is the more irritating. It is a purer alkali than the stone lime and has a more powerful chemical action on the tobacco for that reason.

The Tobacco.—The poor Travancorean adds to his quid a very irritating cheap tobacco from the Coimbatore district. The local name is "vadacan." The better class people use Jaffna tobacco grown in North Ceylon, where also it is used extensively. On detailed inquiry as to the chief areas of export of these two tobaccos, vadacan and Jaffna, it was noted that the chief market for vadacan was found in the south-west coast—i.e., the oral cancer area—and the Jaffna tobacco was chiefly sold in Ceylon and Travancore, and to some extent in other parts of the extreme south India. Both these tobaccos have the reputation of being more irritating than that commonly used in Madras and other parts of south India. Arecanut is an ingredient common to most parts of India and, like the betel leaf, it varies little in quality in the different places, except that the arecanut used in Travancore and Ceylon is the fresh green nut, while that used in other parts is the dried form of the nut. Other spices and flavouring agents are used in different districts, such as catechu, cardamon, nutmeg, &c., but are not likely to be important factors in this investigation.

The important factors are therefore the lime, the tobacco, and the arecanut. While one would not go so far as to say that the use of shell lime, vadacan, and Ceylon tobaccos is confined entirely to the oral cancer area, or that oral cancer never occurs apart from these ingredients, the coincidence is sufficiently marked to justify one in blaming these for the high incidence of oral cancer in the south-west coast.

It has been mentioned already that oral cancer is practically unknown among the coolies of the tea plantations in the hills of Travancore. Investigations as to the differences of the quid showed that while the coolies of the High Range group of tea estates used stone lime, tobacco from the Madura district, and dried arecanut, those of the central and southern ranges used quids identical with the plainsmen—with this exception, the Tamil-speaking coolies used dried arecanut while the Malayalee coolies used green fresh nut. The Malayalee's quid is identical with that used on the sea coast where the disease is common. Obviously then, though the vadacan tobacco and shell lime are known to be more irritating, there must be some other factor to account for the apparent immunity of the hill coolie, who belongs to the same race as the plainsmen and came from the plain himself originally.

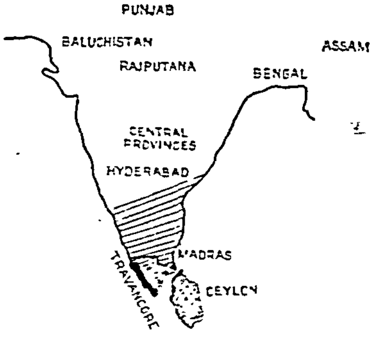

FIG. 1.—Map showing areas of India where the incidence of oral cancer is greatest.

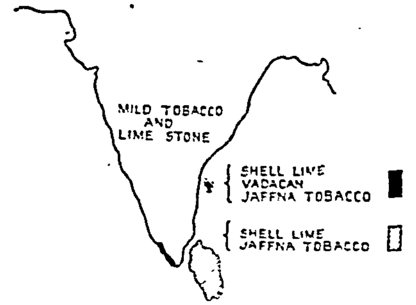

FIG. 2.—Use of shell lime, vadacan, or Jaffna tobacco.

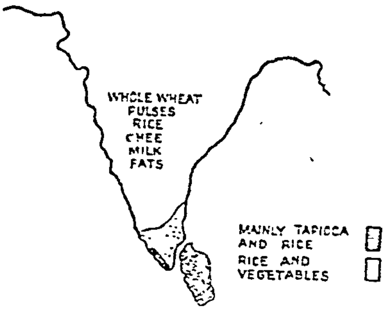

FIG. 3.—Incidence of deficiency diet in India.

One report received from the Bihar district is interesting, since it states that oral cancer is uncommon among the Hindus of the district who chew betel incessantly, but that it is fairly common among the Santals, an aboriginal tribe who do not use betel or arecanut but chew tobacco and lime.

HABITS OF THE PEOPLE

Among the very poor in the coastal villages of Travancore, for whom betel chewing is one of the very few pleasures of life, and to whom expense is an important factor, one quid may be retained for hours together in the mouth, some even sleeping with it. The hill coolie on the other hand can afford to be more extravagant and only chews his quid for five or ten minutes.

The following Table shows the relationship of cancer to heavy betel chewing :—

—	Non-chewers.	Occasional chewers.	3–5 times daily.	Excessive.	Retaining quid in sleep.
100 cancer cases	2	9	24	40	25
100 non-cancer cases ..	34	31	23	10	2

INTERCURRENT DISEASE

Syphilis.—The Wassermann reaction was positive in 12 of 100 cases of cancer in betel nut chewers, but as already stated this is now more than might be expected in the population at large. Syphilis seems to be rife in areas where little or no oral cancer is reported. Syphilitic leucoplakia or glossitis apart from betel chewing is not very common; in fact only 4 cases have been noted in the past two years among 4000 in-patients in the Neyoor Hospital. These all affected the lips, and it is interesting to note that in the cancer cases showing positive Wassermann reactions, lip cancers are in the majority.

Bailey's investigations[3] go to show that syphilitic leucoplakia is the cause of only a very small proportion of cancer of the cervix, and external irritation is the most common cause. Lane-Claypon[4] also reports that while a syphilitic ætiology is assigned to a large proportion of cases of lingual carcinoma, it seems to play little or no part in the cause of cancer of the lip, &c.

NUTRITIONAL DIFFERENCES

The diet of the Travancore people is perhaps of all human diets the one in which the vitamin elements are most poorly represented. A typical diet for one day is as follows: tapioca, 3–4 lb.; rice, 1 lb.; rice water, 3 pints; tamarind, grs. 60–80; red chillies, grs. 60–80; fish, occasionally.

McCarrison,[5] who has done much experimental work on the nutritional deficiency of the diet of the people of south India, has experimented with a large number of rats and monkeys, and has shown conclusively that a lack of vitamin A is responsible for keratinisation of epithelial tissues, round-celled infiltration, secondary inflammatory changes, epithelial growths and ulcers of the stomach, &c. He quotes Walbeck and Howe (1925), who demonstrated a marked keratinisation of the epithelial tissues in a man who died of vitamin-A deficiency, and they state in conclusion "that vitamin-A deficiency affects epithelial tissues in a specific manner."

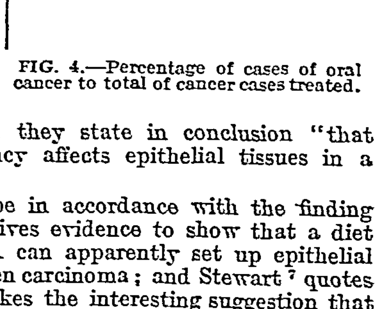

FIG. 4.—Percentage of cases of oral cancer to total of cancer cases treated.

This seems to be in accordance with the finding of Guerin,[6] who gives evidence to show that a diet poor in vitamin A can apparently set up epithelial metaplasia and even carcinoma; and Stewart[7] quotes Redewill, who makes the interesting suggestion that vitamin deficiency, especially deficiency of vitamin A, is an important ætiological factor in cancer, and claims to have cured two cases by increasing the vitamin content of the diet and administering parathyroid. McCarrison[8] undertook an experiment to demonstrate the effect of diet of the poorer classes of Travancore and Madras on the production of gastric ulcer. In his report he gave it as his opinion that both diets were deficient in vitamins, the Travancorean diet being the worse. (The Madrasee diet has no tapioca and much more rice.) Among the people of north and central India the diet contains a greater variety of vegetable foods. In central India wheat, pulse, &c., in the north maize, and in Bengal lentils are used in addition to the eternal rice and curry. As already noted, in the Madras Presidency a large proportion of the poorer people swallow their betel juice, which in itself is a useful adjuvant to the rice diet; various other vegetables also are used by the Madrasee. (Fig. 3.)

It is of interest, therefore, that in the Travancore coast, where the cancer incidence is very high, the diet is remarkably poor in vitamin-containing substances. In Madras Presidency, where oral cancer is found but in smaller amount, the diet is slightly better. In north and central India, where oral cancer is very rare (though betel chewing is indulged in), the diet is much better balanced, with high protein and fat percentage and also more vitamin-containing substances. A further point of great interest is that in the hills of central and south Travancore, where the coolies of the tea estates chew the same betel, lime, and tobacco, oral cancer is scarcely known. Coolies in tea estates of course receive higher and more regular pay, and have a larger variety of vegetable curries in their diet. This marked freedom of the estate coolies from oral cancer is perhaps one of the most striking features of this investigation.

CONCLUSION AS TO THE FACTORS BRINGING ABOUT THE LOCALISATION OF THE DISEASE

The use of shell lime is restricted to what we might call the oral cancer area. In this area also unusually irritating forms of tobacco are used, and over and above this a defective diet makes the epithelial tissues of the people liable to certain tissue changes. In addition the majority of the cancer sufferers keep the quid in the mouth for very long periods. A constant chemical action is going on between the lime and tobacco, probably extracting injurious alkaloids. The hill coolie and those others who expectorate the quid after five or ten minutes do not extract the alkaloids to the same extent.

The fact that the Santals get oral cancer after chewing only tobacco and lime, while the Hindu betel chewers of the same district do not, seems to exonerate the betel and arecanut from the accusation of being carcinogenetic substances. The important factors are in my opinion:

(1) Shell lime and vadacan or Jaffna tobacco.

(2) Prolonged retention of the quid in the mouth.

(3) Epithelial metaplasia due to the low vitamin content of the diet.

Histology of Precancerous Changes

The general tendency in all tissue exposed to the influence of betel chewing for a number of years is to undergo keratinisation. The superficial layer of epithelium is thickened and the most superficial cells of the layer show signs of desquamation.

In the normal cases and in the very early leucoplakia the projections of the rete pegs are not marked, and the rete Malpighii is definitely limited by a layer of basal cells on a well-marked basement membrane. In the more advanced leucoplakias the rete pegs are prolonged downwards, sometimes in an irregular manner. Cell division is seen and in places the basal layer may appear to be deficient. In the corium intense round-celled infiltration takes place, possibly as a defence against the precancerous changes in the superficial layers. As the condition advances the rete pegs become more prolonged and irregular, the basement membrane becomes less obvious, and in places at the tips of the processes the epithelial cells appear to be in direct contact with the connective tissue cells of the corium.

Villard and Montel,[9] in discussing the relationship of chronic cervicitis to cancer, state that the first step towards cancer consists in hyperplasia during which the mucosa of the glands becomes many layered but regular, while giant cells, abnormal mitosis, polymorphy, and polychromasia appear, marking the change to malignancy. Other signs of commencing malignancy are the disappearance of the basement membrane. Bailey[8] also mentions the penetration of the basement membrane in cervical cancer.

Later on the epithelial cells become swollen and separated, with multiple nuclei and signs of rapid division. In places, islets of cells—evidently epithelial processes cut in section—are seen in the deeper tissues, and one or two sections from clinically simple conditions of the mucous membrane show cell nests. The next stage seems to be a tendency for epithelial cells, freed from limitation, to wander into the deeper tissues, some mixing with the round cells, others making their way in the lymphatic channels into the deep tissues, forming new islets of epithelial tissue.

The comparison between the naked-eye appearances and the microscopic findings suggests that:—

> The slight roughening of the cheek seen in all betel chewers corresponds to the keratinisation of the surface epithelium seen in the earlier sections.
>
> The dense leukoplakias correspond to the sections showing penetration into the deeper layers of the rete pegs with round-celled infiltration. Both these are the reaction of healthy tissue to a chronic mechanical and chemical irritation.
>
> This precancerous condition may persist for years before any clinical signs of cancer appear, but if the habit of chewing is continued, eventually the condition becomes malignant. The basement membrane and basal cells, tried beyond endurance by the chronic stimulation of the alkaloid, fail in their normal functions, and the real penetration of the deeper structures begins.

Cheatle,[10] in his monograph on precancerous changes in the breast, states that the cell has, in his opinion, actually become malignant before it has spread beyond normal boundaries. This seems to be borne out in this investigation, and on this point I base my contention, that well-marked leucoplakias, particularly if associated with cracks, fissures, and inflammatory changes, should be treated as malignant, and superficial remedies are of no avail and may do harm.

Treatment

PROPHYLAXIS

Education.—The present generation is past recall in matters of education. India is a land ridden by the custom and habit of generations, and the people most affected by the oral cancer are those least likely to take note of newspaper warnings, public health exhibitions, and the like. The young generation at school, however, are easy to approach, and by diagrams, lectures, and exhibitions, not to mention the object lesson of some relation or fellow villager paying the price of his indulgence, a growing prejudice against the habit and an appreciation of its danger might be inculcated. The main point to drive home is that the evil is in the prolonged mastication of the quid, and that tobacco and lime are a dangerous combination. Ordinary oral hygiene and the inspection and care of the teeth might easily be introduced into the schools.

Legislation.—As shell lime and vadacan tobacco are undoubtedly more irritating and dangerous than the other varieties, a tariff imposed on these, making their price prohibitive, would gradually tend to create a demand for other and milder types. As a very mild variety of tobacco is grown in the Madura district, there ought to be no difficulty in getting it imported cheaply into Travancore.

Dietetics.—Not only is the cancer problem affected by the question of faulty nutrition, but many other diseases, including duodenal ulcer, are certainly influenced by the deficient vitamin content of the standard diet. The government is spending enormous sums of money on public health, but has, so far, ignored the problem of diet. A striking object lesson exists within the State alone, of the immunity of hill coolies (fed on peas, lentils, milk, &c., in addition to the rice and curry) to several diseases which work havoc among their relatives living and working on the plains; I am thinking especially of duodenal ulcer and oral cancer.

A certain sum might be voted annually for the encouragement of vegetable gardening, dairying, and poultry. Much of the land at present waste or devoted to tapioca might be diverted to this purpose.

PRECANCEROUS CONDITIONS

Very early cases.—Those who show only slight roughening of the mucous membrane with a few streaks of leucoplakia and those who have slight glossitis, indicated by an undue smoothness of the surface of the tongue, may be expected to improve if chewing is stopped and thorough dental treatment is carried out. The use of a mild astringent and antiseptic mouth wash is of value; strong antiseptics only make matters worse. Advanced leucoplakia with chronic inflammation, especially if complicated by cracks and fissures, is a very different matter. As shown in the previous section it must be regarded as malignant, for almost certainly at some point or another the resistance has been overcome, and already epithelial cells are breaking away and moving along the paths of invasion. Chewing must be stopped at once. Chillies and other hot stuffs must be eliminated from the diet and everything likely to cause further irritation avoided. Complete extraction of all teeth is advisable (though rarely permitted). We have found that the patients who remain free from recurrence for years after treatment are the edentulous ones. While I do not think oral sepsis is the prime cause of oral cancer, it is undoubtedly a contributing factor once the disease has started. Syphilis if present must be treated along the usual lines. Whenever possible dietetic conditions must be improved, cod-liver oil and fresh vegetables being added to the diet.

The lymphatic glands do not require treatment at this early stage. Occasionally one may find slightly enlarged shotty glands. They are, however, due to chronic inflammation, and can be expected to look after themselves once the mouth is in a healthy condition.[11]

Dealing as we are with a potentially malignant condition, the principle of complete eradication must be followed if success is to be expected, and too often insufficient treatment is the means of speeding up the disease. Several writers, notably Clark,[12] have advocated the use of diathermy in the treatment of precancerous conditions. We have experimented with this form of destructive treatment for some years, and where one is dealing with a small localised lesion the results are undoubtedly satisfactory. The resulting ulcer heals well, and provided the tissue destruction has extended deeply enough there will be no recurrence. With precancerous leucoplakia, however, we are dealing with a widespread tissue change, and the danger points are by no means always immediately under the most obvious superficial lesions. The mechanical irritation has been exerted over a considerable area and the chemical irritation over a still wider one. Therefore unless one is prepared to destroy with diathermy a very considerable portion of one cheek, the neighbouring alveoli, and part of the tongue, one cannot be said to have dealt adequately with the condition. Our experience has too often been that an area of leucoplakia has been destroyed and a month later the patient returns with the treated portion healthy, but with definite cancer at some other site in the mouth. In some cases one might almost feel that the cancer had been stimulated by the diathermy. This fact is noted by Clark in his paper on electro-desiccation.

It is in radium that we find our most powerful ally in the treatment of these early conditions. For this purpose small doses for long periods have been found to be the most effective. Our technique is to use 1·5 cm. needles screened with 0·5 mm. platinum and containing 1 mg. of radium. It is assumed that the useful range of radiation is 1 cm. from the axis of the needle. They are inserted in the affected cheek parallel and at distances of 1 cm., in such a way that the whole of the obviously affected tissue and a considerable part of the surrounding tissue comes under the influence of the radiation. The needles are removed on the tenth day, when the mucous membrane will be found to be covered with a yellowish film. After a few weeks this disappears, leaving a healthy mucous membrane.

Keith [13] advises that any leucoplakia of the mouth which does not rapidly clear up with hygienic treatment should be given radium therapy. He advocates the use of radon needles.

TREATMENT OF THE ESTABLISHED DISEASE

Until two years ago every case of oral cancer at the Neyoor Hospital was operated upon, if operation was at all possible. As the majority affected the cheek or jaw far back, it is extremely difficult to get beyond the range of the cancer, and a case which did not recur in two years was the exception; if recurrence did take place it was usually in a situation which put further operation out of the question. Cheek cancers were particularly disappointing in this respect. Early cases involving the jaw have on the whole been very satisfactory, for the ideal surgical procedure of removing en bloc the entire growth and a wide area of surrounding tissues and the glands was possible in the operation for removal of lower jaw. Exact follow-up figures are impossible to obtain in this country, where people come from long distances and do not always have a postal address. Moreover, the natural tendency for one suffering from recurrence is to assume that Western skill has failed and to put his trust in a native quack doctor.

With the advent of radium, however, we have been able to obtain very much better results, particularly in cheek cases. One point of interest in this study is the fact that, while recurrence on a part which has received an adequate dose of radium is rare, recurrences are fairly common in other parts of the mouth. These might be better termed new growths, for by their situation they could not possibly be extensions from the original ulcer. For example, a man who had a well-localised fungating cancer of the cheek treated by radium reported in six months with three minute papillomatous growths, two in the other cheek and one in the hard palate.

While a full account of the methods and results of radium treatment as employed at the Neyoor Hospital would be out of place in this paper, which deals chiefly with the ætiology and early manifestations of the disease, it may be stated that we have found exceedingly encouraging results from the use of radium needles as already described in the treatment of leucoplakia. A cauliflower growth of the lip might have six to ten needles according to its size. An extensive growth of the cheek extending into the buccal pad of fat and through to the skin would probably require 15 to 20 needles as the first dose, and a second smaller dose to some part more difficult of access.

It is our experience that cauliflower growths which do not infiltrate deeply are the most responsive, while growths involving the jaw do badly on the whole, on account of the tendency of the bone to necrose. The jaw cancers therefore wherever possible are removed by operation, and radium applied later to any doubtful area. Where a jaw cancer is quite inoperable radium may be applied first of all, to reduce the growth, and the jaw removed later, any gap left being closed by a plastic operation. In all cancers treated by radium alone the glands have been removed by a block-dissection.

One practical point worthy of mention is that we have found it unwise to remove teeth till the cancer has been at least partially dealt with by radium. We have had several cases where cancer cells have apparently been spread into the teeth sockets by removing teeth first of all. It is undoubtedly desirable to remove all teeth before the case can be said to have been fully treated.

Summary

Investigation has shown that oral cancer is exceedingly common in the coastal towns and villages of Travancore, and is by far the most common form of cancer. This is true of Ceylon and the Malabar coast, but in the district immediately east of Travancore the condition is found less frequently, while in other parts of India the incidence of oral cancer is no greater than one would expect to find in western countries. In the hill districts of Travancore among the estate coolies the disease is uncommon, though a few cases have been seen from time to time. The people, however, belong to the same social group as those on the plains who are so prone to oral cancer.

The quid of the Travancorean is peculiar in that the tobacco and lime are of very irritating quality and very different from that found in other parts of south India, though it is similar to that used in the hill districts. While many races in India chew betel, some are in the habit of swallowing the quid after chewing, others who add tobacco to the quid do not swallow but spit out after 5 to 10 minutes' chewing. The poorer class Travancorean however retains the quid for long periods in the cheek.

The diet of the poorer Travancorean consists almost entirely of rice and tapioca, and is very deficient in protein and vitamin A. The diet of the coolie class in the Madura district east of Travancore contains a larger variety of vegetables, while the hill coolie is even better nourished.

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THE LABORATORY DIAGNOSIS OF TYPHOID INFECTIONS

By ARTHUR COMPTON, M.D., D.Sc. N.U.I.
DIRECTOR AND BACTERIOLOGIST-IN-CHIEF, MUNICIPAL PUBLIC HEALTH LABORATORIES, ALEXANDRIA, EGYPT; AND

ISKANDER ABDEL SAID, M.B. LOND.
BACTERIOLOGIST AT THE LABORATORIES

Felix [1] has initiated, and Stuart and Krikorian,[2] Gardner,[3] Pijper,[4] and others have reported favourably upon, what purports to be a helpful improvement in the serodiagnosis of typhoid infections. The improved method, based on studies of antigenic analysis, is held to be *particularly useful in the interpretation of laboratory results arising from blood specimens from individuals who at one time or other in their previous history have been prophylactically inoculated against typhoid.*

The disease is endemic in Alexandria, and theoretically a certain proportion of partially protected individuals are about. The statistics for 1929, 1930, and 1931 show respectively 822, 684, and 589 cases, with 145, 116, and 92 deaths, on a population of approximately 600,000. In 1929 the municipality opened a prophylactic centre for the gratuitous vaccination of all and sundry. Approximately between 25,000 and 30,000 persons per year have since availed themselves of this service. For instance, for the year 1931 the numbers are : 16,034 received T.A.B. vaccine (saline) in two inoculations at weekly intervals, and 10,366 received one inoculation of T.A.B. lipovaccine, representing a total of 26,400 *inoculated individuals as a minimum estimate.* Add to this the number of inoculations performed annually by private practitioners, and we obtain a rough idea of the range of partial protection existing in the community. This works out at 4–5 per cent. as a rough estimate of the proportion of the community annually receiving protection.

To determine the practical value of Felix's method *of differentiating between inoculation and infection* agglutinins in such a partially protected community, we tested, without any special selection, some 70 blood specimens sent to these laboratories for routine Widal examination during nine consecutive months of 1931. To this end we supplemented our two ordinary methods of laboratory serodiagnosis : (1) hæmoculture with the clot, and (2) quantitative macroscopic agglutination towards "H" emulsions of T, A, and B organisms with the serum, by (3) testing in addition the agglutinating action of the serum *against an "O" emulsion of* T.

THEORETICAL BASIS OF "H" AND "O" AGGLUTININS IN TYPHOID

During *active enteric infection* Felix [1] has indicated that there develops in the serum of non-inoculated individuals both "H" and "O" agglutinins. The former are specific, and the agglutination of "H" emulsions of either T, A, or B organisms definitely fixes the causal agent; while the latter are non-specific, and pure "O" emulsions of T, A, or B organisms are all alike agglutinated, so that differentiation of the infecting organism is impossible with "O" emulsions. A further non-specificity of "O" agglutinins to be borne in mind is that they agglutinate both "H" and "O" emulsions of the infecting organism, whereas "H" agglutinins, which are more specific, react only with "H" suspensions of the organism. This complication is of minor consequence, since it can be unravelled by observation of the macroscopic appearance of the agglutination with a given antigen. "H," or specific, agglutination is characterised by particles which are large-flaking and easy to dislodge, and found in turbid supernatant fluid when examined inside two hours; while, under the same circumstances, "O" or group agglutination is characterised by small-flaking particles difficult to dislodge in clear supernatant fluid. The "H" type of agglutination, being always specific, is, under the conditions stated at the beginning of the paragraph, diagnostic of the infecting organism.

In *inoculated individuals*, in addition to the development of "H" and "O" agglutinins for the particular organism of infection, there may occur an all-round stimulation of inoculation agglutinins for all three organisms (T, A, and B), the latter agglutinins being of the "H" kind. This means a superadded, and therefore higher, "H" titre for the particular organism responsible for the infection—e.g., *B. typhosus*—with lesser titres of "H" agglutination for the others of the series (*B. para*-A and *B. para*-B). A higher titre of any "H" agglutination is therefore presumptive of the infecting organism, while "O" agglutination is only diagnostic of "enteric group" infection.

In *febrile conditions* other than enteric (typhus, malaria, pneumonia, influenza, and other diseases) there is in anti-typhoid inoculated individuals stimulation of "H" agglutinins only. The latter being here of no diagnostic significance, it is the absence of "O" agglutinins which enables a negative report to be given as concerns enteric infection.

Thus "H" agglutination is supposed to be the hall-mark of inoculation agglutinins, "H" and "O" that of infection agglutinins, and "O" that of the agglutinins of normal human serum in low dilutions. Felix[1] has stressed that macroscopic agglutination, to be reckoned as positive, must occur with "H" emulsions in titres up to at least 1/100, while with "O" emulsions only very marked macroscopic agglutination in 1/100 can be regarded as diagnostic.

On reducing the foregoing considerations to some simple working expression, we arrive at the theoretical agglutinations of "H" and "O" emulsions schematised in Table I.

TABLE I.—*"H" and "O" Agglutinations*

Serodiagnosis.			"H" emulsions.	"O" emulsions.
Non-typhoid fevers in the	Non-inoculated..		−	− (+)
	Inoculated ..		+	− (+)
Typhoid fevers in the	Non-inoculated.	Definite T, A, or B	+	+
	Inoculated	Definite T, A, or B ..	+ >	+
		"Enteric group" ..	(+) −	+

− = agglutination nil.
(+) = ,, poor = up to 1/50 (non-diagnostic).
+ = ,, good = ,, ,, 1/100 and more.
+ > = ,, comparatively better for one—e.g., T—than the two others (A and B).

MATERIALS AND METHODS

"H" emulsions.—These were prepared from strains of *B. typhosus*, *B. para*-A, and *B. para*-B (hereafter referred to as T(H), A(H), and B(H)). The first and third were obtained some six years ago by courtesy of Dr. Kilian Clarke from his collection at the Ransome Memorial Laboratory, Nottingham, and the second was kindly sent to us by Dr. A. Felix, Lister Institute, London, being the strain designated by him as "H" A1. Twenty-four hour surface cultures on agar were washed off with saline and heated for one hour at 60° C., then emulsified to approximately 500,000,000 per c.cm. (opacity method—hæmocytometer table), and finally phenol was added, to 0·5 per cent., as preservative.

"O" emulsion.—This was made in like manner from the strain "O" 901 *B. typhosus* (Felix and Olitzki[5]). Preliminary trials showed us that emulsions of this strain heated for one hour at 60° C., whether phenolated to 0·5 per cent. or not, gave identical results up to 1/100 with serums rich in "O" agglutinins. In other words, inhibition of "O" agglutination by the phenol in this concentration was insufficient to warrant its addition as a preservative to the stock emulsion being omitted.

Technique of hæmoculture.—After clotting of the blood specimen, the clot was fished out aseptically and inoculated into a tube of MacConkey's lactose-taurocholate-peptone water, and after incubation overnight at 37° C. a small loopful was seeded on to a moist Endo slope for single colony isolation and ultimate identification of any growth. The serum after centrifugalisation, or standing, was utilised for agglutination.

Technique of agglutination (Widal test).—The clear serum was put up in 0·5 c.cm. portions of dilutions 1/25, 1/50, 1/100, and 1/200 in small agglutination tubes (2 by ½ in.) with 0·5 c.cm. portions of the foregoing four emulsions: T(H), A(H), B(H), and T(O), giving final serum dilutions of 1/50, 1/100, 1/200, and 1/400. The mixtures were incubated overnight at 50° C., and after standing to cool the results were recorded.

READING OF RESULTS

Concerning the reading of agglutination results obtained overnight at 50° C., it is important to stress the appearance of the suspension fluid as much as, or even more than, the appearance of the particles. At times it is difficult to discriminate between floccular (H) and granular (O) particles; then careful observation of the suspension fluid helps considerably. "H" agglutination is characterised by floccular or large flaking, fluffy particles, which break up easily on shaking, giving to the suspension fluid a turbid or semi-opalescent appearance. "O" agglutination is characterised by granular or small-flaking, denser-looking particles, which disintegrate less readily on shaking, so that the interstitial suspension fluid remains clear. It is noteworthy that a serum showing good agglutination with "H" and "O" phenolated emulsions respectively shows some apparent change of the "O" agglutination (granular particles, clear suspension fluid) into "H" agglutination (floccular particles, turbid suspension fluid) for the end-titres with "O" emulsion. It is certainly an advantage, then, when working with phenolated "O" emulsions, to make the test quantitative by practising a series of dilutions (1/50 to 1/200) to fix the type more easily. This effect might possibly be interpreted by some authorities as an instance of inhibition of the "O" agglutination by the phenol; but a simpler explanation seems to us to lie in the progressive dilution of agglutinins in the end-titres, which means of itself weaker and imperfect agglutination, with tendency to the "H" appearance of agglutination.

ANALYSIS OF RESULTS

Of the 70 specimens examined—all derived from patients with fever and sufficiently suspicious clinically to justify their bloods being sent to the laboratories for serological examination—27 gave a positive agglutination result with one or more of the four antigenic emulsions mentioned, while 43 gave entirely negative results. In the positive agglutination series of 27, four positive hæmocultures with isolation of *B. typhosus* in pure culture were encountered. Four hæmocultures positive to *B. typhosus* were met with in the series of 43 negative agglutinations. The latter figure is important, since it indicates that, by carrying out the culture of all clots, the laboratory diagnosis of typhoid is improved by 4/43, or approximately 10 per cent.

Table II. sets out the serological classification of the 27 positive results in terms of "H" and "O" agglutination titres and hæmoculture.

TABLE II.—*Serological Classification of Results*

Number of specimen.	Degree of agglutination with—				Hæmoculture.
	"H" emulsions.			"O" emulsion.	
	T (H).	A (H).	B (H).	T (O).	
1	††	–	–	+	–
2	††	–	–	+	–
3	††	–	–	††	–
4	††	–	–	††	–
5	††	–	–	–	–
6	(+)	–	–	(+)	–
7	††	–	–	††	–
8	††	–	–	††	–
9	+	(+)	–	+	–
10	+	–	–	(+)	*B. typhosus.*
11	††	–	–	+	*B. typhosus.*
12	††	–	–	††	–
13	††	–	–	††	–
14	††	+	–	††	–
15	††	–	–	††	–
16	+	–	–	+	–
17	††	(+)	–	+	–
18	††	–	–	††	–
19	††	–	–	††	*B. typhosus.*
20	††	–	–	††	–
21	††	–	–	††	–
22	–	–	+	–	–
23	(+)	–	–	+	–
24	††	–	–	††	–
25	††	–	–	††	–
26	††	–	–	††	*B. typhosus.*
27	–	–	+	–	–

†† =agglutination up to 1/200.
+ = ,, ,, ,, 1/100.
(+) = ,, ,, ,, 1/50.
– =nil agglutination or negative hæmoculture.

This table shows that, working with "H" emulsions, 20 positive specimens out of 27 gave single, clear-cut, T-infection results, and two specimens (Nos. 22 and 27) gave single, clear-cut, B-infection results. Three specimens (Nos. 9, 14, 17) gave double T and A agglutination, indicative presumably of individuals recently inoculated. But the serodiagnosis of T-infection was not in doubt in any of the three, as the T-titres were distinctly higher than the A-titres. Thus 25/27 of the specimens are accounted for by the use of "H" emulsions alone. In only two specimens (Nos. 6 and 23) was the serodiagnosis in doubt. No. 6 possibly represents an early T-infection agglutination occurring with T(H) emulsion in the uncertain titre of 1/50, and nothing with the A(H) and B(H) emulsions; while "O" agglutinins were present, but in insufficient quantity to permit of a definite "enteric group" diagnosis. Specimen No. 23, giving higher T(O) than T(H) titre, and giving nothing with A(H) and B(H) emulsions, is to be interpreted as a theoretically typical "enteric group" result (see Table I.) in an individual previously inoculated with T-vaccine only or who had suffered in the distant past from typhoid fever.

On general analysis, of the 27 positive sero-agglutination results it is seen that only for one specimen (No. 23) is there an improvement of laboratory diagnosis as a result of taking into account the "O" agglutination of Felix. This represents a 1/27, or approximately 4 per cent., improvement of positive results. On further analysis, Table II. reveals that high titres (1/200 and 1/100) of "H" or species agglutination occur with about equal frequency with high titres of "O" or genus agglutination; actually 23 times for T(H) and 22 times for T(O). It follows that, when dealing with the agglutination reaction of bloods of uncertain clinical history towards ordinary T, A, and B emulsions ("H" emulsions), the laboratory diagnosis of the bacteriological species of infection is just as easy or easier to make than the vaguer diagnosis of "enteric group" infection.

Is it possible to infer from the table what proportion of the entire 70 specimens came from previously inoculated individuals? Four specimens (Nos. 1, 2, 10, and 11) show higher titres for T(H) than T(O). If there is anything in the theory, they represent specimens with superadded "H" agglutinins from a previous inoculation. With the three specimens previously referred to as showing combined T(H) and A(H) agglutination, this gives 7/27 of the specimens giving a positive Widal, which came presumably from patients who had previously been inoculated against typhoid. On the total of 70 specimens examined this gives 7/70 or 10 per cent. This figure is not out of keeping with the previous rough estimate of 4 to 5 per cent. of the community being vaccinated annually, which over a 2–2½ year period—a usual interval between inoculations for many people—would represent an average floating protection of 10 per cent., and the two numbers balance.

Again, when we classify, in terms of "H" and "O" agglutination, the eight serums from which *B. typhosus* was isolated in pure culture from the clots, we obtain the classification of Table III.

TABLE III.—*Classification of Typhoid Sera*

Titres.	Number of positive hæmoculture serums giving agglutination with—			
	"H" emulsions.			"O" emulsion.
	T (H).	A (H).	B (H).	T (O).
Positive up to 1/200 ..	3	0	0	2
,, ,, ,, 1/100 ..	1	0	0	1
,, ,, ,, 1/50 ..	0	0	0	1
Negative	4	8	8	4

Table III. shows that, working with ordinary "H" emulsions, a serodiagnosis of species infection (titres 1/100 and 1/200) was possible in 4/8, or 50 per cent., of these bacteriologically proved typhoid cases, while with "O" emulsion a serodiagnosis of genus, or "enteric group," infection was revealed by the method in only 3/8, or 37½ per cent. The development of "H" agglutinins during the course of infection appears here to have been slightly more pronounced than the development of "O" agglutinins. This would fit in with some of the cases having undergone a previous T.A.B. vaccination with stimulation of inoculation agglutinins. Yet it is strange on the theory that no measurable stimulation of A(H) or B(H) agglutinins was recorded for any of the eight specimens.

COMMENT AND SUMMARY

The results recorded in this paper show that in the presence of negative and non-diagnostic (1/50) sero-agglutination results the diagnosis is improved by approximately 4 per cent. when a sensitive phenolated "O" emulsion is included in the technique of the Widal test. It is improved by approximately 10 per cent. when systematic hæmocultures are carried out with all specimens, utilising the clots to this end.

Whether a serodiagnosis improved to the extent of 4 per cent. may or may not be thought a justification for complicating laboratory reports with the vaguer diagnosis of "enteric group" infection is an open question. The bacteriologist and the clinician can only decide that between them. The greater improvement and precision of laboratory diagnosis arising from the systematic carrying out of hæmocultures cannot be sufficiently insisted upon. Yet this is far from being the general practice of laboratories in Egypt. In our experience, also, practitioners do not avail themselves sufficiently of the help which the laboratory can afford by bacteriological examinations of fæces and urine specimens in obscure typhoidal conditions characterised by negative or doubtful Widal results. The agreement of 10 per cent. of Widal positive specimens showing supplementary evidence of the presence of inoculation agglutinins, and the calculated approximately floating proportion of 10 per cent. of the population being inoculated within 2½ years, is a striking finding.

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HYPERTENSIVE ENCEPHALOPATHY IN NEPHRITIS

By Horace Evans, M.D., M.R.C.P. Lond.

ASSISTANT PHYSICIAN AND ASSISTANT DIRECTOR OF THE MEDICAL UNIT, LONDON HOSPITAL

Headache, convulsions, coma, amaurosis, and other evidences of diffuse or focal disturbances in the brain have long been known to occur in association with nephritis. Such manifestations were until recently considered as uræmic in nature. Volhard,[1] however, has shown that they often occur in the absence of renal insufficiency. Arterial hypertension is the constant feature in all cases presenting this cerebral symptom-complex, hence the designation "hypertensive encephalopathy," which was first adopted by Oppenheimer and Fishberg.[2] The condition has also been referred to as acute uræmia (Osler), acute or eclamptic (false) uræmia (Volhard [1]), and hypertensive cerebral attack (McAlpine [3]). An identical symptom-complex may be seen in lead encephalopathy and eclampsia gravidarum, and less severe attacks are not uncommon in cases of essential hypertension. The fact that such symptoms may appear in association with essential hypertension, but not in conditions leading to anuria, seems good reason for differentiating them clearly from the manifestations of toxic uræmia.

The condition is relatively uncommon in nephritis. Of 90 cases of acute nephritis and of 70 cases of chronic nephritis which have come under my observation during a period of four years, hypertensive encephalopathy was noted in 7 of the acute and in only 2 of the chronic cases. They seem worthy of report, firstly, because little attention has been paid to the condition in this country; and secondly, because of the striking way in which some of them responded to treatment. The following is a summary of the records:—

CASES OF ACUTE NEPHRITIS

CASE 1

A boy, aged 14, was admitted to the London Hospital (No. 31821/29) complaining of puffiness of the face. He had been perfectly well until ten days previously, when he had had a common cold. Six days before admission his mother had noticed that his face was puffy, especially in the mornings, and that his urine was dark red in colour; during the next few days there had also been a little swelling of his ankles. There had been no sore-throat, headache, or visual disturbance. He had never been ill before.

On *examination* he was a pale youth with marked œdema of the face, lumbar pads, and shins. The tonsils were large and slightly injected. There was no demonstrable enlargement of the heart; the blood pressure was 140/90 mm. Hg. A few basal crepitations were present in both lungs. The abdomen had a full appearance but there was no demonstrable ascites. Both kidneys were tender on palpation. The fundi appeared normal except for a fullness of the veins.

Investigations.—In the urine blood was visible to the naked eye; albumin ½ volume; deposit of very many red cells, many granular and hyaline casts, leucocytes, and epithelial cells. Blood-urea, 0·048 per cent.

Progress.—The day after admission he complained of severe frontal headache, and said that his eyes felt queer. The blood pressure was 150/90. There was frequent vomiting. At 8.15 A.M. he became completely blind for about an hour, after which time his vision returned. At 11.30 A.M. vision was again lost, but he was able to differentiate between light and dark. He appeared to be in a semi-comatose state with occasional periods of excitement, and exhibited fever up to 103°. The plantar reflexes were extensor. During the next ten days he remained in this semi-comatose state, and his vision remained defective. The œdema of the trunk and limbs had gradually disappeared during this period, but that of the face persisted. On the tenth day he could be roused to answer questions, and several times complained of hunger. After this the blood pressure gradually fell to 105/75, the œdema of the face began to diminish, and with its disappearance there was a coincident recovery of his vision and general mental state. This case was treated with a moderately restricted diet, repeated lumbar puncture, and morphia. He was discharged, after six weeks in hospital, feeling quite well and with only a trace of albumin in the urine. A year later he was perfectly well, the blood pressure was 110/70, and the urine was clear.

CASE 2

A girl, aged 10, was admitted (No. 40766/31) complaining of swelling of the face and severe headache. She had been perfectly well until four days before admission, when her mother had noticed that the child seemed out of sorts and that her face was swollen, especially in the mornings. Three days later she began to complain of severe frontal headaches which made her cry out and vomit. Nothing abnormal about the urine was noticed, nor was there any swelling of the feet. There was no history of any recent infection. She had never been ill before, apart from an attack of measles. During the past six months she had been in the habit of going to the swimming-bath two or three times a week, often staying in the water for three-quarters of an hour. She often shivered and looked blue when she came out.

On *examination* she was a fair-haired child with marked puffiness round the eyes and slight œdema of the back and ankles. There was some pallor of the mucous membranes. The tonsils were slightly enlarged. The heart was a little enlarged, the apex-beat being just at the nipple line; the blood pressure was 150/100. The lungs and abdomen were normal. No abnormality was seen in the fundi.

Investigations.—The urine was smoky on admission, and contained ⅙ volume of albumin. Microscopical examination of a deposit showed many red cells and a few granular casts. Blood-urea: 0·03 per cent.; P.S.P. (phenolsulphonephthalein) test, 59·4 per cent. in two hours; urea clearance, 59·2 per cent. of normal. Blood count: red cells, 4,200,000; hæmoglobin, 64 per cent.; colour-index, 0·76; leucocytes, 8400.

Progress.—Four days after admission the child became extremely restless, complained of intense headache, and vomited frequently. She lay on her side, with the head extended. There was puffiness round the eyes, and marked prominence of the temporal veins, especially on the right side. The blood pressure was 175/100. At 7.30 P.M. venesection was performed, 100 c.cm. of blood being withdrawn; and 10 c.cm. of cerebro-spinal fluid was drained off by lumbar puncture, the pressure appearing to be normal. These procedures resulted in no improvement. At about midnight she became semi-comatose, the respiration-rate dropped to 7, there was twitching of the right arm, and complete flaccidity of the lower limbs. There was demonstrable neck rigidity. The house physician diagnosed a cerebral hæmorrhage. A venesection was again performed and 400 c.cm. of blood drawn off. A very striking and immediate improvement followed, almost reminiscent of the treatment of hypoglycæmic coma with intravenous glucose. The respiration-rate returned to normal; she began to move about and answered questions reasonably. The blood pressure was 95 systolic; during the next 24 hours it rose again to 160/100. During the next four days she was given nothing but sips of water and orange juice, the total fluid intake being less than half a pint in 24 hours. At the end of this period the œdema and hæmaturia had disappeared, the albuminuria had diminished to a cloud, and the blood pressure was 110/70. Her diet was then gradually increased. Six weeks later tonsillectomy was performed without any ill-effect.

Eight weeks after admission she was discharged feeling and looking well. The urine contained a faint cloud of albumin, and the blood pressure was 110/75. When she was seen 18 months later she was perfectly well, the urine was clear, and the blood pressure was 100/70. During this period she was treated with large doses of iron, and a blood count showed 5,200,000 red cells, and hæmoglobin 88 per cent.

CASE 3

A boy, aged 14, was admitted (No. 30493/32) complaining of swelling of the face, headache, and vomiting. He had been perfectly well until eight days before admission, when he had noticed that his face was puffy and his water was red. A week later he had had severe headache, nausea, vomiting, and abdominal pain. No swelling of the legs had been noticed. There was no history of any infection preceding this illness. The only previous illnesses he had suffered were measles and chicken-pox.

On *examination* he was a pale boy with some pallor of the mucous membranes and definite puffiness of the face. The temporal veins were prominent. There was very slight œdema of the back, but there was none over the shins. The tongue was dry and furred, and the tonsils were slightly enlarged and injected. The heart was enlarged, the apex-beat being just external to the nipple line; there was no thickening of the arteries; the blood pressure was 180/100. The lungs and abdomen were clear. Examination of the fundi revealed no abnormality.

Investigations.—The urine was smoky and contained ¼ volume of albumin on admission. Examination of a deposit showed many red cells, leucocytes, hyaline and granular casts, and occasional leucocytic casts. Blood-urea: 0·042 per cent. Blood count: red cells, 4,000,000; hæmoglobin, 65 per cent. The cerebro-spinal fluid was colourless, with 1 lymphocyte per c.mm.; protein, 0·025 per cent.; negative Wassermann, and chlorides, 0·74 per cent. (NaCl).

Progress.—Soon after admission he began to complain of pains in the head and dimness of vision, and at midnight began to have fits of an eclamptic type. Venesection was performed, 360 c.cm. of blood being withdrawn. This caused immediate relief of his symptoms, but at 7 A.M. the following morning the fits began again but were not nearly so severe. Lumbar puncture was performed and 20 c.cm. of cerebro-spinal fluid were allowed to drain off; there was no obvious increase in pressure. This resulted in a marked improvement with cessation of the fits. There was no marked change in the pulse-rate associated with this acute phase of the illness. For the first four days in hospital he was given fruit juice only, his total fluid intake being restricted to one pint in 24 hours. At the end of the first week the blood pressure was 120/80, and all signs of œdema had disappeared, but hæmaturia persisted until the third week. He was discharged from hospital at the end of five weeks, the apex-beat being in its normal position, the blood pressure 105/80, and the urine showing only a faint trace of albumin. Eight months after discharge he was perfectly well; the blood pressure was 85/45 and the urine was clear.

CASE 4

A man, aged 42, was admitted (No. 31419/32) complaining of shortness of breath and dimness of vision. He had been perfectly well until two weeks before admission, when he had noticed that he was very short of breath even on slight exertion. A week later he had noticed that his eyesight was failing and that his legs were swollen. He had complained of headache. No disturbance of micturition or changes in the urine had been noticed. His occupation consisted in scraping antimony pipes, used for concentrating citric and tartaric acids. He had never had any previous illness.

On *examination* he was a pale, semi-conscious man and resented examination. There was definite puffiness round the eyes, and marked œdema over the lumbar regions, shins, and ankles. The heart was slightly enlarged to the left but there was no abnormal thickening of the brachial and radial arteries; the blood pressure was 210/105. The lungs and abdomen were clear. Examination of the fundi revealed some swelling of the discs, with filling up of the optic cups; the macular areas in each eye were pale. No abnormality of vision was noted.

Investigations.—The urine was smoky on admission, and contained 2/3 volume of albumin; a deposit showed many red cells, few leucocytes, and epithelial cells. Blood-urea, 0·054 per cent.; P.S.P., 37·5 per cent.; urea clearance, 73 per cent. of normal.

Progress.—On the day after admission he suddenly became blind. This onset of blindness was associated with great excitability and repeated efforts to get out of bed. His mental condition was extremely confused, and he complained of severe headache. Venesection was performed (400 c.cm.). After this he was quieter but not much improvement was noted. On the fifth day venesection was repeated, and lumbar puncture was performed on the sixth and seventh days. The cerebro-spinal fluid pressure was increased. At the beginning of the second week his mental condition improved very much and he became quite rational; the œdema had completely disappeared, the blood pressure was 150/90, the albumin diminished to a cloud, and he was able to see a hand held in front of him. The blood pressure continued to fall and was 125/90 at the end of the third week. His vision improved a little so that he could read large print with difficulty.

He was discharged after nine weeks in hospital with his vision still very much impaired in both eyes; the blood pressure was 120/90, and the urine contained a haze of albumin. When seen four months later he looked and felt well. His vision, however, had not improved.

CASE 5

A married woman, aged 28 years, was admitted to hospital (No. 40023/32) complaining of swelling of the face and shortness of breath following an attack of "influenza." She had been perfectly well until four weeks before admission, when she had had a sore-throat, headache, and shivering attacks. She had remained in bed for two days. About three weeks later she had noticed some puffiness of her face in the mornings and a little swelling of her ankles in the evenings. She had also noticed some shortness of breath, a little swelling of her abdomen, and difficulty in passing her water; no change in the colour of her urine had been noticed. There had been frequent frontal headaches since the onset of the swelling. She had had one child five years previously, with a normal pregnancy and confinement.

On *examination* she was a pale woman with marked puffiness of the face and moderate œdema of the back and legs. The skin was white and pale, and there was anæmia of the mucous membranes. The teeth were bad and the gums showed a marked degree of pyorrhœa. The tongue was moist and clean. The heart was slightly enlarged, the apex-beat being just outside the nipple line. There was no thickening of the brachial and radial arteries; the blood pressure was 185/100. Both pleural cavities contained a little fluid. The abdomen looked full but there was no demonstrable ascites; both kidneys were tender to palpation. The fundi appeared normal.

Investigations.—The urine was smoky; albumin, ⅙ volume; deposit of many red cells and leucocytes, epithelial cells, and occasional hyaline casts. Blood-urea, 0·078 per cent.; P.S.P., 26·1 per cent. in two hours; urea clearance, 26·5 per cent. of normal. Blood count, 3,800,000 red cells; hæmoglobin, 58 per cent.

Progress.—On admission she was put on orange juice only, the maximum fluid intake in 24 hours being 15 oz. On the fifth day she had an eclamptiform fit, being unconscious for about 15 minutes and remaining drowsy for several hours afterwards. The next day she seemed very distressed and short of breath, and coughed up blood-stained frothy sputum. She was cyanosed; her pulse-rate was 120; her apex-beat half an inch outside the nipple line, and her blood pressure 170/110; and there were moist sounds throughout both lungs. Venesection was performed (600 c.cm.), and she was given an intravenous injection of strophanthin gr. 1/100 and put on digitalis. These procedures were followed by considerable relief. In the fourth week there was no demonstrable œdema, her weight was about a stone less than on admission, and the blood pressure was 125/85; the urine contained a cloud of albumin. Her teeth were extracted during the sixth and seventh weeks. This caused a slight exacerbation of her condition. She was discharged 13 weeks after admission looking and feeling well; the blood pressure was 120/60 and the urine contained a faint cloud of albumin. She was seen a year after discharge and was perfectly well. The blood pressure was 120/85 and the urine was clear.

CASE 6

A married woman, aged 61, was admitted (No. 40516/33) complaining of puffiness of the face and headaches. Eight weeks before admission she had had a severe chill followed by a quinsy on the right side. A week later her face had become puffy and her ankles had been swollen. During the week before admission she had begun to complain of headache, vomiting, and shortness of breath. For three days her mind had been wandering, she had complained of blurred vision, and her urine had been dark in colour. There was no history of any previous renal disease. She had had seven normal pregnancies.

On *examination* she was a pale, ill-looking woman, with definite puffiness of the face and anæmia of the mucous membranes. There was slight pitting œdema over the shins and ankles. The throat looked injected, the tonsillar glands were palpable. The heart was enlarged, the apex-beat being half an inch external to the nipple line; the arteries were not unduly thickened for her age; her blood pressure was 180/110. There were a few scattered rhonchi and basal crepitations in both lungs. The abdomen appeared normal. Examination of the fundi revealed bilateral papillœdema with one area of exudate and a small hæmorrhage in the left fundus; there was no exudate or hæmorrhage visible in the right.

Investigations.—The urine contained blood; albumin, ¾ volume; and a deposit of blood and epithelial cells. The blood-urea was 0·033 per cent., gradually rising to 0·144 per cent. in the course of eight days and falling to 0·057 per cent. in four weeks. Blood count: red cells numbered 3,000,000; hæmoglobin, 40 per cent.; colour-index, 0·66. The cerebro-spinal fluid contained two cells per cubic millimetre and protein 0·025 per cent. The blood Wassermann reaction was negative.

Progress.—A few hours after admission she vomited and had an epileptiform fit. On examination after the fit had passed off there was neck rigidity, the veins of the head and neck appeared more full than previously, and the blood pressure was 190/120. She was extremely excitable and irrational, talking incoherently, shrieking out at the top of her voice, and attempting to get out of bed. The respiration-rate was only 8 per minute. Lumbar puncture was performed and 15 c.cm. of cerebro-spinal fluid were drawn off under increased pressure, after which she was given morphia. The next day her mental condition was unchanged, but there was no recurrence of the fit. Examination of the fundi showed bilateral papillœdema, marked prominence of full and tortuous veins, narrow and indistinct arteries possibly due to the swelling of the retinæ, and numerous areas of exudate and hæmorrhage. Catatonia was demonstrable in the upper limbs. Lumbar puncture was again performed, and 40 c.cm. of fluid were drained off under a pressure of 240 mm. of water, and she was given 60 c.cm. of 15 per cent. saline intravenously. That evening she became extremely restless, and venesection (400 c.cm.) was done in spite of the anæmia. This was followed by considerable improvement, and by the next evening she was fairly rational and quite restful. During the next few days she remained in a semi-comatose state with frequent twitchings of the limbs, and the respiration-rate remained slow (8–10). On being roused her mental condition was fairly rational. At the end of the first week there was another short attack of mental excitability. This attack was controlled by morphia. After this there was a definite improvement, and the blood pressure settled round about 145/85.

This patient has now been under observation for a period of six weeks. The blood pressure has remained in the neighbourhood of 155/90, and her mental condition has been rational. During the third week the œdema disappeared, there was a definite improvement in the retinopathy, and the temperature, which had been about 99°–100°, became normal. By the fifth week there was only one patch of exudate to be seen in the left fundus and a few hæmorrhages in both fundi. The albuminuria has persisted, and a recent renal function test shows the blood-urea to be 0·057 per cent. During the acute phase of the illness she was given only fruit juice, with the total fluid intake restricted to one pint in 24 hours.

CASE 7

A boy, aged 7 years, was admitted (No. 30783/33) complaining of swelling of the face and drowsiness. Seven days before admission he had seemed out of sorts. His mother had noticed that his face was puffy and that his ankles were swollen. Four days later his water had been noticed to be dark in colour. The swelling had gradually increased and he had become drowsy. There had been a discharge from the right ear for a day or two. There was no history of any other preceding infection.

On examination he was a pale, ill-looking child with marked puffiness of the face. There was moderate pitting œdema about the ankles. The veins about the head and neck were unduly prominent, and there was some neck rigidity. The apex-beat was at the nipple line and was forcible; the blood pressure was 195/130. The lungs and abdomen were clear. The fundi were normal except for fullness of the veins.

Investigations.—The urine contained blood and albumin, ½ volume. The blood-urea was 0·087 mg. per cent. The cerebro-spinal fluid showed no excess of cells; protein, 0·04 per cent.; urea, 0·073 per cent.

Progress.—On the day after admission he seemed worse and began to vomit. The œdema of the face was more marked, the temporal veins were very prominent, and the neck rigidity was marked. The pulse-rate was 124. That evening at 6 P.M. he had an epileptiform fit. Venesection was performed (240 c.cm.), and 40 c.cm. of cerebro-spinal fluid were drained off by lumbar puncture; the pressure was abnormally high. This gave considerable temporary relief, but at 1 A.M. he had another fit and his temperature, which was 98° on admission, had risen to 105°. This second fit was not so severe, and after it had passed off his general condition seemed quite good. Ten hours later he quite suddenly became restless and distressed; he was noticed to be extremely cyanosed and short of breath. On examination he was very cyanosed and dyspnœic, the lungs were full of bubbling moist sounds, and the apex-beat could be felt an inch outside the nipple line. Acute heart failure with pulmonary œdema was diagnosed. A further 90 c.cm. of blood were withdrawn, and he was given morphia gr. 1/24 and atropine gr. 1/200. This caused a little improvement, but two hours later he was still very cyanosed and distressed, and the chest signs remained unchanged. He was then given strophanthin gr. 1/500 intravenously. This was followed by a dramatic improvement within half an hour. The following day the lungs were clear and the apex-beat was at the level of the nipple line. A week later there was no demonstrable œdema, the blood pressure was 130/90, and the urine contained only a trace of blood with a cloud of albumin.

CASES OF CHRONIC NEPHRITIS

CASE 8

A boy, aged 13 years, was admitted (No. 30494/31) complaining of headache and vomiting. He had been under the care of Mr. Hugh Lett in 1921, when he had some hæmaturia and pain on micturition with the passage of a small calculus. Two calculi were removed from the bladder by suprapubic operation at this time; they were found to be cystine stones. A year later he had had an operation on the right kidney for the removal of further cystine stones. He had then been well until he was aged 12 years, when he began to have frequent attacks of headache and vomiting in the early morning, with considerable thirst and nycturia. There had never been any œdema of the legs, but his parents had noticed that his face was puffy when he had the headaches. There was no family history of any renal disease.

On *examination* he was a well-built boy without any evidence of dwarfism. There was a definite puffiness about the eyes but no demonstrable œdema elsewhere. The heart was enlarged, the apex-beat being an inch outside the nipple line. There was only slight thickening of the brachial arteries; the blood pressure was 240/170. The lungs were clear. There was nothing abnormal in the abdomen with the exception of healed operation incisions. The right fundus was normal; the left fundus showed swelling of the optic disc and several patches of exudate and hæmorrhages in the macular region.

Investigations.—The urine was of large volume and low fixed specific gravity, containing a heavy cloud of albumin and a deposit of a few red cells. The blood-urea was 0·064 per cent.; P.S.P., 41·9 per cent. in three hours; urea concentration, 1·26 per cent. in 100 c.cm. Three weeks later the blood-urea was 0·126 per cent.; P.S.P., 4·5 per cent. in two hours; and the urea clearance, 14·7 per cent. of normal. The blood count showed 5,000,000 red cells and a hæmoglobin percentage of 62, falling to 2,400,000 red cells and 40 per cent. in a period of five weeks. The cerebro-spinal fluid was colourless with no excess of cells; protein 0·06 per cent., and Wassermann reaction negative.

Progress.—During the third week after admission he began to complain of very severe headache. The œdema of his face was more prominent. Lumbar puncture was performed and 20 c.cm. of cerebro-spinal fluid were allowed to drain; this was under increased pressure. Considerable relief of the headache followed this. The next morning the headache came on again, and he had an eclamptiform fit, after which he complained that he was unable to see. There was frequent vomiting, the face was swollen, and the temporal veins were unduly prominent. There was definite neck rigidity, and he lay on his side curled up with the head extended. The blood pressure was 210/160. That evening he had another fit. Lumbar puncture was performed again and 35 c.cm. of fluid were withdrawn, again under considerable pressure. Two days later he had three more fits and lumbar puncture was again performed. Throughout, attempts were also made to control the fits with rectal injections of 25 per cent. magnesium sulphate and hypodermic injections of morphia. There were no further fits. By the fifth week there was an improvement, inasmuch as the fits had ceased, the headaches were less severe, his vision had gradually returned, and his blood pressure was 185/150. He died six weeks after admission. At necropsy no abnormality was found in the brain.

CASE 9

A girl, aged 11, was admitted (No. 41994/32) complaining of attacks of headache and vomiting. About nine months before admission she had begun to have attacks of severe headache and vomiting in the early morning. The attacks occurred especially during the week-ends. For three or four months there had been nocturnal frequency with occasional nocturnal enuresis. There had been no swelling of the legs but the mother had noticed that the child's face was puffy when she had the headaches. About two weeks before admission she had had a "cold," and had complained of an ache in the back. Since this her urine had been dark in colour. There was no history of any previous renal disease. The paternal grandfather had died of "Bright's disease," and her sister is a renal dwarf, without hypertension.

On *examination* she was a pale, red-headed child, mentally bright, and without any evidences of dwarfism or rickets. There was anæmia of the mucous membranes. The face was not puffy. The heart was enlarged, the apex-beat being three-quarters of an inch external to the nipple line; there was excessive pulsation in the neck and suprasternal notch; the brachial and radial arteries were definitely thickened; the blood pressure was 250/150. The lungs and abdomen were clear. The fundi showed well-marked hypertensive neuro-retinopathy.

Investigations.—The urine contained blood; albumin, ⅔ volume; deposit of red cells; streptococci on culture, and a tendency to fixation of the specific gravity about 1010, occasionally 1020. The blood-urea was 0·031 to 0·067 per cent. Blood count: there were 5,100,000 red cells, and the hæmoglobin was 65 per cent. The blood Wassermann was negative.

Progress.—Two days after admission she complained of severe headache, vomited several times, and became semi-comatose. Her face was puffy; the pulse-rate was 130, and the blood pressure 250/150. Venesection (450 c.cm.) was performed, with considerable relief of symptoms, the blood pressure falling to 170/100. The daily output of urine was round about 30 oz. at this time. She then remained fairly well during the next two weeks, the urine becoming free from blood after a week in hospital, after which the blood pressure rose again to 230/130, when she complained of severe headache again, had a fit, and became semi-comatose. Lumbar puncture was performed and 20 c.cm. of fluid were drained off under considerable pressure. The blood pressure fell to 190/110, but there was little relief of symptoms. Further venesection was not done because of the anæmia, a blood count showing 2,200,000 red cells and hæmoglobin 32 per cent. She remained in this semi-comatose state for nearly two weeks, frequently screaming out, complaining of headache, and being so noisy that the whole ward was disturbed. Morphia was frequently required to quiet her. During this period she ate nothing, but drank large quantities of fluid and had frequent wet beds.

At the end of the two weeks she began to take an interest in her surroundings and steadily improved during the next few days. The blood pressure was 140/110, and the blood-urea was 0·028 per cent. at this time. The daily output of urine began to increase, reaching 76 oz. She was then fairly well until two weeks later, when she had severe headache and vomiting again. She complained that her vision was blurred. Puffiness of the face was again prominent and the blood pressure was 240/160; the pulse-rate rose to 140. The 24-hourly urinary output dropped to 18 oz., having been 119 and 62 oz. on the two previous days. At this time a prominent pulsation resembling an aneurysm was observed in the right side of the neck just above the clavicle; this was due to kinking of the carotid artery. The veins in the neck were also very prominent. She was given morphia gr. ¼ and 30 c.cm. of 15 per cent. saline intravenously. The following day she was better, the blood pressure was 210/165, and the kinking of the carotid was much less evident. Two weeks later a similar attack occurred again, associated with severe headache, vomiting, hypertension and tachycardia, and puffiness of face. On the day this attack began the urinary output was only 20 oz., as compared with 50 and 60 oz. on the two preceding days. The child has now been observed for a period of 15 weeks, and has had further slight attacks during the past few weeks.

CLINICAL FEATURES

The presenting clinical features are hypertension associated with headache, vomiting, fits, coma, mental changes, and amaurosis, all of which may be seen in one case. In addition I have noticed puffiness of the face, congestion of the veins about the head and neck, more rarely neck rigidity, and in one case a prominent kinking of the carotid artery. In Case 9, which was under observation for a considerable time, each attack of hypertensive encephalopathy was preceded by a marked increase in blood pressure, development of puffiness of the face, intense headache and vomiting, increased arterial pulsation in the neck, and an increased urinary output; when the attack became fully developed there was marked tachycardia and the urinary output fell.

Arterial hypertension was present in every case, an additional rise frequently preceding the actual attack of encephalopathy. The pressure readings varied between 150/90 and 250/150; the former was in a child whose normal blood pressure was subsequently found to be 110/70. *Headache* was present in every case and generally severe, often causing the patient to cry out; more often it was frontal, but in severe cases it was referred to the back of the head and neck. *Puffiness of the face* was also present in all cases. Its onset and disappearance were often noticed to coincide with the onset and cessation of the encephalopathic symptoms.

Similarly there was always *anæmia* of moderate or severe degree, and *coma* varying from slight stupor to marked insensibility. *Vomiting* occurred in seven cases and was often very severe; it was usually of the "cerebral type." *Fits,* of an epileptiform or eclamptiform type, were observed in six cases. *Mental changes* were marked in a few cases. These patients were extremely restless, with alternating attacks of coma. During the restless periods they would attempt to undress or get out of bed; they talked nonsense and frequently shrieked out at the top of their voices. This was a very prominent feature in Cases 4 and 6. *Amaurosis* was present in five cases. One patient (Case 1) was blind for ten days, after which he completely recovered. The blindness appeared to be due to a central lesion, the pupils usually being dilated and reacting to light. *Hypertensive neuro-retinopathy* was observed in four cases. The retinopathy is not necessarily associated with amaurosis, and probably only causes a defect of vision if there are gross macular changes. In Case 6 we observed the development of a gross neuro-retinopathy within a period of 20 hours. The main features were papillœdema, full and prominent veins, indistinct narrow arteries, and areas of yellowish-white exudate and hæmorrhages scattered throughout an œdematous retina. Where there was no definite neuro-retinopathy, a prominence of the veins was often noted as the only change. This made the arteries appear relatively small and indistinct. *Prominence of the veins* about the head and neck was noticed before and during the attacks in several cases. *Neck rigidity* with extension of the head was noted in four cases. *Marked pyrexia* was noted in two cases, in one instance the temperature rising to 105° F. *Tachycardia* was present in two cases, and *slowing of the respiration-rate* to seven per minute was also recorded in two cases. *Cataleptic phenomena* occurred in one case. *Renal function* tests showed some impairment, but this was never gross. *Blood-urea* determinations varied between 30 and 87 mg. per 100 c.cm. in the acute cases. In one case (Case 2) there was no renal insufficiency as shown by the blood-urea and the phenolsulphonephthalein test. *The cerebro-spinal fluid* pressure was increased in seven cases.

PATHOGENESIS

The cause of hypertensive encephalopathy in nephritis is still uncertain. Seven of the nine examples were in cases of acute nephritis in which the renal damage was not severe, as shown by the slight impairment of renal function tests and the high rate of complete recovery. Furthermore, similar cerebral attacks are seen in eclampsia and essential hypertension, in both of which conditions the renal function is usually normal. It therefore appears that impairment of renal function is not a predisposing factor.

Arterial hypertension is present in all cases, and often a subsequent rise of blood pressure is to be observed, preceding the attack of encephalopathy. The acute cerebral episodes of eclampsia gravidarum and lead encephalopathy bear a striking resemblance to those of hypertensive encephalopathy, and in both these conditions hypertension is a constant feature. It therefore seems reasonable to suppose that the phenomena concerned in the production of the hypertension bear a close relationship to these cerebral attacks. In addition, the fact that these cerebral attacks are relatively more frequent in association with acute nephritis and eclampsia gravidarum, rather than with chronic nephritis or essential hypertension, seems to suggest that the phenomena associated with a rapid rise of blood pressure are still more important considerations. Nevertheless, even though hypertension is a constant finding in every case, the exact nature of its relationship to the syndrome is uncertain.

The brain shows no evidence of focal lesions when examined at necropsy. The two mechanisms most generally advanced to explain these cerebral attacks are cerebral œdema and ischæmia due to spasm of the cerebral arterioles. Several authors have reported cerebral œdema in association with the hypertensive states, and Tanquerel des Planches [4] has described cerebral œdema in a case of lead encephalopathy. We know, however, that cerebral œdema may occur without any of the cerebral manifestations described above. Further, I have never observed such cerebral symptoms in cases of nephrosis with gross generalised œdema, and indeed the condition is rarely seen in any type of nephritis associated with gross œdema. A slight degree of œdema of the face, however, was constant. On the other hand, cerebral ischæmia resulting from a spasm of the cerebral arterioles is the view held by Volhard, who believes that cerebral œdema is a direct result of the ischæmia. His view is supported by: (*a*) the associated hypertension; (*b*) the rapid onset and disappearance of the symptoms; (*c*) the observations made on spasm of the retinal arteries by Haselhorst and Mylius [5] in a case of eclampsia; (*d*) the fact that spasm of cerebral vessels causing an area of ischæmia has been observed at operation in status epilepticus; and (*e*) the known relationship between lead, angiospasm, and encephalopathy. In the cases recorded above I have never been able to observe any spasm of the retinal arteries, though the arteries frequently appeared relatively narrow and indistinct owing to their partial obliteration by the swelling of the retina and the prominence of the full and tortuous veins.

On the available evidence the question must still remain open, though the idea of angiospasm is attractive, especially in view of the rapid appearance and disappearance of the symptoms—e.g., the amaurosis—which is difficult to explain on any other basis. Finally, it cannot be too strongly emphasised that hypertensive encephalopathy is entirely unrelated to nitrogen retention.

DIAGNOSIS AND PROGNOSIS

The diagnosis of hypertensive encephalopathy in a patient known to suffer from diffuse nephritis is rarely difficult; the cerebral phenomena are associated with hypertension and appear in the absence of any marked uræmia. In certain cases, however, in which hypertension and true uræmia coexist, it may be very difficult to determine whether the cerebral symptoms are related to hypertension or uræmia or to a combination of both factors. A consideration of the main clinical features mentioned above and the recognition of the fact that epileptiform convulsions and amaurosis rarely occur in true uræmia without hypertension will help to elucidate the problem.

Cerebral hæmorrhage or thrombosis may give rise to attacks resembling hypertensive encephalopathy, though they are usually of longer duration. If such manifestations are transient and without residue and if hypertension is present, they are unlikely to be due to hæmorrhage or thrombosis. I have seen two cases of acute nephritis in children, without any marked degree of nitrogen retention, in which death was preceded by epileptiform fits; at necropsy a subdural hæmorrhage was found in each case. Lumbar puncture will assist in the elucidation of such cases and will also confirm the presence or absence of meningitis, which may give rise to difficulty owing to neck rigidity.

True epilepsy may be simulated by the fits, but in the former there is no hypertension, albuminuria, or neuro-retinopathy. Cerebral tumour with convulsions is a not infrequent cause of difficulty, the retinal changes often closely resembling those seen in hypertensive encephalopathy; an examination of the blood pressure and the urine should prevent this mistake.

The outlook in cases of acute nephritis with hypertensive manifestations is generally good, though it can never be certain until the fits have ceased. All my cases of this type recovered, and it was noticeable that there was no tendency towards marked renal insufficiency with true uræmic symptoms. Therefore it appears to be important to differentiate clearly between hypertensive encephalopathy and uræmia. The amaurosis usually clears up within hours or days —in one case (Case 1) after ten days' blindness. Frequent and severe fits are of ill omen, as heart failure is apt to follow with little warning. Cases 5 and 7 are good examples of the type of sudden heart failure which I have seen in several cases of acute nephritis.

TREATMENT

It has already been emphasised that the symptoms of hypertensive encephalopathy do not result from renal insufficiency but are most probably due to circulatory disturbance in the brain resulting in ischæmia and in some cases œdema. Therapy should therefore be directed towards improving the cerebral circulation. Venesection and lumbar puncture are two methods of treatment of undoubted value, the former being used over a century ago by Bright.[6] I have seen excellent results follow venesection in this condition, and I believe that it should always be adopted unless there is a very severe anæmia, which is rare. The mechanism whereby venesection causes improvement in these cases is difficult to explain. It seems unlikely that the improvement can be due simply to the removal of a certain volume of blood or to a reflex dilatation, as suggested by Volhard,[1] because the immediate fall in blood pressure is often slight. I have, however, found that the removal of a small volume of blood may be useless and advocate about 400 c.cm. for a child of 10–14 years and 600 c.cm. for adults. The results of lumbar puncture are occasionally good, especially where the pressure is increased, but occasionally the result is disappointing even with a raised pressure. The intense headache is often considerably relieved. The fluid should be allowed to drain off slowly, and we prefer the procedure to follow a venesection.

Intravenous hypertonic saline is another method which has been used extensively for lowering the intracranial pressure. The use of a solution of magnesium sulphate in place of saline has been recommended by Blackfan.[7] Especially in cases of acute nephritis, however, I feel that any mode of treatment which increases the blood volume even temporarily is not without danger; therefore I advocate intravenous medication only in the rare cases in which other methods fail, or where anæmia might contra-indicate bleeding. When the method is used it seems advisable to give small volumes of a more concentrated solution.

Morphia is undoubtedly the most valuable drug and should be used in every case. Examples of hypertensive encephalopathy in nephritis which do not respond to treatment by venesection, lumbar puncture, and the administration of morphia are rare, though the use of these three procedures in all cases makes it difficult to assess the relative value of each. Amyl nitrite and nitro-glycerin have been tried without success. Calcium has been recommended in cases associated with tetany. Dietetic restriction is to be adopted especially in the acute nephritis group. Fruit juices only should be given, with a daily total fluid intake of one pint, the diet being increased only when the blood pressure falls.

Acute heart failure with pulmonary œdema is a complication to be feared. A prompt treatment of the hypertensive state resulting in cessation of the fits and a lowering of the blood pressure will avoid such an event in most cases. When the heart fails, it does so with little warning and requires prompt treatment. Bleeding followed by an intravenous injection of strophanthin should be carried out immediately. Morphia and atropine may also be of value. The effect of strophanthin is sometimes very striking; its administration should be followed by digitalisation. Two of our patients exhibited acute heart failure, and both responded excellently to the treatment outlined above.

SUMMARY

1. Nine cases of hypertensive encephalopathy in the course of nephritis are reported; seven of these were in cases of acute nephritis.

2. The syndrome is quite unrelated to true uræmia, with which, however, it is sometimes associated.

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4. The more frequent appearance of the syndrome in acute nephritis is perhaps associated with the relatively sudden onset of the vascular changes.

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WITH INTRAVENOUS INJECTION OF ASCORBIC ACID

By Poul Schultzer, M.D.
RESIDENT PHYSICIAN, MEDICAL DEPARTMENT II, MUNICIPAL HOSPITAL, COPENHAGEN

In 1932, in England and America, some very interesting and significant papers (Svirbely and Szent-Györgyi, Harris and Mills, Waugh and King) were published on the action and chemistry of hexuronic acid, which was discovered by Szent-Györgyi in 1927, and isolated by him from plants and the adrenal cortex in 1928. In 1933, for chemical reasons, Szent-Györgyi and Haworth changed the name of this substance to ascorbic acid. These reports, which were published independently of one another, showed that Szent-Györgyi's ascorbic acid gives the same biological and chemical reactions as vitamin C. From the various experiments it was evident that 0·5–1·0 mg. ascorbic acid corresponded to 1·5 c.cm. decitrated lemon juice, both being protective doses for guinea-pigs on a diet free from vitamin C. It is not settled conclusively whether ascorbic acid is identical with vitamin C, for ascorbic acid has not yet been produced synthetically.

While thus the antiscorbutic action of ascorbic acid in guinea-pigs is an established fact, no report has appeared so far as to the effect of this substance on scurvy in man. This paper gives the record of a case of scurvy in an old man that was cured with ascorbic acid, which Prof. Szent-Györgyi had been kind enough to let me have.

CASE RECORD

The patient was a married man, aged 68, a former blacksmith, who was admitted to the Municipal Hospital of Copenhagen, on May 11th, 1933.

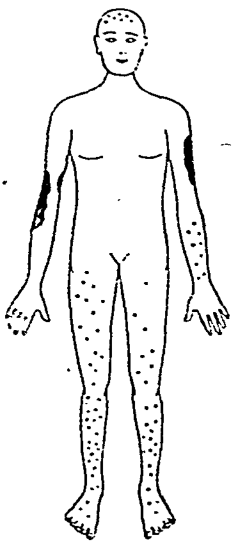
Anamnesis.—In his younger days the patient consumed very large amounts of alcohol, and he had delirium tremens several times during the period of 1899–1923. In 1917 he was under treatment for gastritis. In 1928 he was suffering from a condition similar to his present illness. At that time he was treated with a diet consisting mainly of vegetables and fresh fruit, and he recovered. In 1931 he was run over by a motor-car; since then he has frequently suffered with pains in the back. Otherwise he gives a past history of good health.

Concerning his diet he gives the following data: His morning meal consists of coffee and Vienna bread. At noon he takes every day oatmeal porridge with beer instead of milk. He takes fish every other day, but very seldom meat. In addition his midday meal usually consists of bread and butter, cheese, and smoked meat sliced very thin. In the afternoon he takes coffee with Vienna bread. In the evening he takes every day two fried eggs with bread and butter. He never has milk or any dishes prepared with milk, nor potatoes, vegetables, or fruit. His wife, who is invalid from an abdominal operation, leaves the preparation of the meals to him. She takes the same diet, but has in addition boiled cabbage, vegetable soup, bananas, and apples—foods which our patient does not care for.

About a month before he entered the hospital his gums began to feel sore, and a week before his admission there appeared swelling with pains around the right elbow; at the same time red spots came out on his extremities and on his bald head.

On admission.—The patient was well-nourished but looked somewhat feeble and sallow. The bald crown of his head, the left forearm, and both legs showed numerous small ecchymoses, each a few millimetres in diameter, mostly grouped around the hair follicles. Both arms were the site of large, firm, and tender ecchymoses (see Figure). His teeth were extremely defective, represented merely by a few stumps, and they were loose. Around these stumps of teeth the gums were markedly swollen, bluish-red in colour, and bleeding readily. Palpation of the muscles revealed some rather large and tender infiltrations in the left side of the back. Examination of the lungs and heart showed no abnormalities. The urine did not contain any blood, albumin, pus, or sugar. The temperature was normal.

The hæmoglobin was estimated as 80 per cent. (Sahli). The blood count was 4,000,000 red cells and 7100 white cells per c.mm. The differential count of the white cells gave 71 per cent. polynuclear neutrophils, 26 per cent. lymphocytes, 2 per cent. monocytes, and 1 per cent. eosinophils. The number of thrombocytes was 220,000 per c.mm. of plasma. Two examinations with Ewald test-meal showed a condition of gastric achylia (Congo 0, phenolphthalein 35 and 30, respectively). X ray examination of the stomach showed no sign of any tumour formation. X ray examination of both elbows and of the ribs showed no periosteal reaction; but there were signs of old fractures of some of the left ribs posteriorly.



Localisation of the cutaneous bleedings on May 12th, 1933.

Treatment.—On admission the patient was placed on a diet that did not contain any potatoes, vegetables, fruit, or raw milk; and he was kept on this diet throughout the treatment. On May 16th it was ascertained that the large ecchymoses had increased in size. In the next week this condition remained unchanged. As now it was established that the scorbutic condition was, if anything, progressing, on May 23rd treatment was instituted with daily intravenous injection of 40 mg. ascorbic acid, dissolved in 3 c.cm. of normal saline solution. Very marked improvement appeared within five days of this treatment. The gums around the tooth stumps became pale and wrinkled, and they bled no more. The ecchymoses began to fade; they were softer and their margins were yellowish in colour. At the same time the patient stated of his own accord that he was feeling much better and that the pains in his back and right elbow had subsided a great deal. On June 2nd the small ecchymoses were almost colourless, and the ecchymoses had improved further; the treatment was therefore cut down to an injection of ascorbic acid every other day. On June 12th there were merely some indistinct traces of the ecchymoses. Under this treatment there was a typical change in the looks of the patient. Now he was rosy and bright.

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COMMENTS

Diagnosis.—There can be no doubt that this patient suffered from scurvy. The anamnesis was typical and the symptoms characteristic. Besides, it was ascertained that these symptoms were progressing when the patient was kept continuously on a diet deficient in vitamin C.

One factor that may have contributed to the development of scurvy in this case is the condition of gastric achylia. Göthlin (1931) claims that achylia predisposes to C-avitaminosis because vitamin C will keep only in an acid medium.

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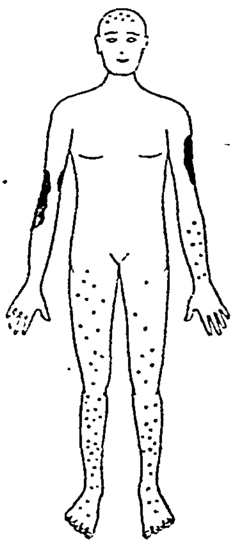

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One factor that may have contributed to the development of scurvy in this case is the condition of gastric achylia. Göthlin (1931) claims that achylia predisposes to C-avitaminosis because vitamin C will keep only in an acid medium.

Capillary resistance test.—Göthlin's test has the advantage over previous tests that it is standardised to a higher degree.

It is carried out as follows: A von Recklinghausen cuff is applied to the upper part of the arm, and the pressure in the cuff is raised to 50 mm. mercury; this pressure is maintained for 15 minutes. Then the pressure is released, and the petechiæ are counted that appear within a circle, 6 cm. in diameter, which is printed, with a rubber stamp, in the plica cubiti. Up to 6 petechiæ make a normal number, 7 and 8 are border values.

From the results of this test Göthlin draws far-reaching conclusions as to the vitamin C content of the diet. However this much appears to be certain—what I have also observed myself (1933) in studies on hospital patients under treatment for peptic ulcer—that a slight degree of C-avitaminosis is associated with a lowered capillary resistance which increases again when vitamin C is added to the diet. On the other hand, severe scurvy does not always give a positive reaction with the capillary resistance test, and in the case reported above the number of petechiæ decreased considerably—without becoming normal—while the scurvy was progressing. This may be attributed, I think, to the scorbutic œdema surrounding the firm ecchymoses on the upper part of the arm. When the ecchymoses subsided the capillary resistance became normal.

Treatment.—The intravenous treatment of scurvy is not altogether new. Thus, in 1918, Hess and Unger reported briefly that they had successfully treated some scorbutic children with intravenous injection of orange juice. Considering that ascorbic acid, which was isolated first by Szent-Györgyi from bovine suprarenals, is in all probability identical with the hexuronic acid prepared by Waugh and King from lemon juice, I had no scruples about trying the intravenous treatment. The ascorbic acid I used was prepared from paprika (Svirbely and Szent-Györgyi, 1933).

Dosage of ascorbic acid.—The daily intravenous injection of 40 mg. ascorbic acid, which is stated to correspond to 60–120 c.cm. of lemon or orange juice, may certainly be considered a relatively small dose in proportion to the great effect observed. Experience in the English Navy, in former times, indicates that 1 oz. (=30 c.cm.) of lemon juice is the daily protective dose for adults against scurvy. Göthlin, who insists that the protective dose must be able to exclude also the condition of latent scurvy (i.e., conditions associated with a decrease of the capillary resistance), concludes that 42–60 c.cm. of orange juice is the daily dose required for a man of 60 kg. In the present case a rapid curative effect was obtained with an amount of ascorbic acid that corresponds to 1–2 times the oral protective dose, according to Göthlin. It seems unlikely that the 40 mg. ascorbic acid if given by mouth would have produced the same effect, especially in view of the gastric achylia in this patient.

SUMMARY

(1) Scurvy developed in a man whose diet, according to his statements, was deficient in vitamin C. A condition of gastric achylia, subsequent to alcoholic gastritis, was also demonstrated in this patient. (2) In hospital he was kept on a similar deficient diet, and the scorbutic symptoms grew worse. Then he was given daily intravenous injections of 40 mg. ascorbic acid which resulted in rapid recovery from the scurvy.

(*References at foot of next column*)

METHOD FOR INCREASING THE SENSITIVENESS OF THE WASSERMANN REACTION

By R. W. Fairbrother, M.D. Manch.,
M.R.C.P. Lond.

ASSISTANT DIRECTOR OF THE PUBLIC HEALTH LABORATORY AND LECTURER IN BACTERIOLOGY, MANCHESTER UNIVERSITY

The Wassermann reaction is the test officially recognised in this country for the serological diagnosis of syphilis. It is therefore necessary that this test should be as sensitive as is compatible with specificity.

Wyler [1] has recently stated that by using serum in dilutions of 1/1, 1/2, 1/3, and 1/4 the sensitiveness of the reaction was raised about 20 per cent., while the specificity was unimpaired. As this seemed an important advance it was decided to investigate the practicability of this modified reaction in a routine laboratory, where some 500 sera are examined weekly. Various sera giving either negative or doubtful results when tested by our usual laboratory technique were selected for examination. This consisted of a further test using increased strengths of serum.

TECHNIQUE

The essential features of the method employed for the routine tests are given below :—

Complement.—Guinea-pig serum, which was usually kept frozen for a few days. This was titrated daily, and three M.H.D. were used.

Antigen.—Alcoholic human or sheep heart extract (5 parts) and 1 per cent. alcoholic solution of cholesterol (4 parts). These were mixed each day, and the mixture diluted rapidly 1/25 with normal saline.

Hæmolytic system.—Sheep red blood corpuscles standardised by the hæmoglobin content to 10 per cent. on the Sahli scale, sensitised with three M.H.D. of amboceptor.

Patient's serum.—Heated at 56° C. for half an hour on the morning of the test, and used in dilutions 1/5, 1/15, and 1/45.

The test proper.—Mixtures containing one volume (0·5 c.cm.) of the various dilutions of the inactivated serum, antigen (1/25), and complement (3 M.H.D.) were incubated, with a control tube in which saline was substituted for the antigen in the presence of the highest strength of the serum under examination, at 37–39° C. for one hour. Two volumes (1 c.cm.) of sensitised cells were next added, the tubes again incubated for one hour at 37–39° C. and then left overnight at 0° C., after which readings were taken.

Modified test.—In the preliminary experiments the same technique was employed using serum dilutions 1/1, 1/2, 1/3, and 1/5. The serum control tube always contained the greatest serum concentration examined.

Readings.—The degree of hæmolysis in the tests was compared with a graduated scale of hæmolysed cells. This

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[1] Wyler, E. J.: Ministry of Health Rep., Pub. Health Med. Subjects No. 67, London, 1932.

(*Continued from previous column*)

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was prepared by mixing lysed cells with unlysed cells in various proportions, the total volume in each tube was the same as that employed in the tests—i.e., 2·5 c.cm.—antigen (0·5 c.cm.) and saline (1 c.cm.) being added to make the readings strictly comparable. This scale passed from complete absence of lysis (0), to complete lysis (1), in a series of 11 tubes in all. Tube 0·1 contained 0·1 c.cm. of lysed cells and 0·9 c.cm. of unlysed cells; tube 0·2 contained 0·2 c.cm. of lysed cells and 0·8 c.cm. of unlysed cells and so on.

In order to simplify comparison of the results the following scheme was adopted for recording the readings :—

Readings 0, 0·1, and 0·2 = positive (+++).
,, 0·3 to 0·6 = weakly positive (++).
,, 0·7 to 0·9 = doubtful (+).
,, 0·95 to 0·99 = very doubtful (+−).
,, 1 = negative (−).

Readings 0·95 and 0·99 were obtained when hæmolysis was not quite complete, but was more marked than that present in tube 0·9.

RESULTS

It was found that undiluted (1/1) serum was unsatisfactory because (*a*) in several instances at this strength the serum exhibited distinct anti-complementary properties, and (*b*) the amount of serum required for the test was too large for many specimens received. This strength was therefore not employed, and it was decided to compare the results obtained with a large series of sera diluted 1/2 and 1/5. The results deal with the examination of 850 specimens of serum using these two dilutions. They have been arranged in three groups :—

1. From cases probably not syphilitic.
2. From cases probably syphilitic—primary or latent tertiary cases.
3. Positive cases, proved by clinical and serological observations, undergoing treatment.

It is impossible to separate entirely the first two groups, and it must be recognised that in these two groups there might be some overlapping—i.e., some cases placed in group 2 might belong to group 1, and vice versa.

Group 1.—The sera placed in this group were obtained from cases which were under examination for the purpose of excluding a diagnosis of syphilis. A number were from potential blood donors. In some instances the sera were badly lysed, but marked anti-complementary activity was only observed on one occasion, and this was also present in the routine method. The results are given in Table I.

TABLE I

Number of sera examined = 354

Serum dilutions.		Number.	Number in group.
1/5	1/2		
−	−	341	349
+−	+−	6	
+	+	2	
+−	−	2	2
+−	+	2	3
+−	++	1	

The results were very consistent; in only 5 out of 354 (1·4 per cent.) cases was any difference observed in the readings of the 1/2 and 1/5 dilutions. In these five cases the difference was only slight, and in no instance was a false positive recorded.

Group 2.—This group included cases in the primary or early secondary stages, the diagnosis being made by clinical examination, and in many instances by the detection of *Treponema pallidum* in scrapings from the primary sore. The other sera were from cases in the late stages—aneurysm, neurosyphilis, &c. The results are given in Table II.

TABLE II

Number of sera examined = 124

Serum dilutions.		Number	Number in group.
1/5	1/2		
+++	+++	12	51
+	+	21	
+−	+−	15	
−	−	3	
+−	−	1	1
−	+−	2	10
−	+	6	
−	+++	2	

Serum dilutions.		Number	Number in group.
1/5	1/2		
+−	+	12	29
+−	++	10	
+−	+++	7	
+	++	9	22
+	+++	13	
++	+++	11	11

No change in the results was observed in 51 cases. In all the others, except one, the readings of the 1/2 strength were more definite than with the 1/5 dilution. In fact of 10 cases "negative" at 1/5 8 gave "doubtful" or "very doubtful" readings at 1/2, while 2 were "positive." Also 17 sera "very doubtful" at 1/5 were either "positive" or "weakly positive" at 1/2.

(One case deserves particular mention; this was one of neurosyphilis, the cerebro-spinal fluid examination was "positive" while the blood gave a "negative" reaction at 1/5, when tested at a dilution of 1/2 it was found to be "positive.")

Group 3.—These cases were definitely syphilitic undergoing treatment.

TABLE III

Number of sera examined = 372

Serum dilutions.		Number	Number in group.
1/5	1/2		
+++	+++	11	202
+	+	30	
−	−	161	
+−	−	2	2
−	+−	3	10
−	+	3	
−	++	2	
−	+++	2	

Serum dilutions.		Number	Number in group.
1/5	1/2		
+−	+	27	68
+−	++	21	
+−	+++	20	
+	++	24	58
+	+++	34	
++	+++	32	32

The more definite readings given by the 1/2 dilution as compared with a dilution 1/5 are once again obvious. In only 2 cases was the reading at 1/5 more positive than that at 1/2, and the difference was only "very doubtful" as compared with "negative." Against this it is seen that 10 cases "negative" at 1/5 gave "doubtful" or "positive" results at 1/2, and of these 4 were either "positive" or "weakly positive." Also 68 sera "very doubtful" at 1/5 gave a stronger reaction at 1/2, 20 being "positive."

DISCUSSION

The results obtained in this work support the claim made by Wyler that the sensitiveness of the Wassermann reaction can be increased without loss of specificity by increasing the quantity of the serum to be tested. For routine work, however, it is necessary that a definite dilution or series of dilutions should be adopted. It has been found quite impracticable to employ a serum strength of 1/1 for reasons given above, but there seems to be no contra-indication against using a serum dilution of 1/2.

There is no question that an increase in the sensitiveness of the reaction is a most useful step. This especially applies to the tests carried out on treated cases. An advantage is the reduction in the number of doubtful examinations.

One objection might be that another serum dilution in the quantitative method would make the test too cumbersome. This may be so, but it seems preferable to replace the largest dilution, as 1/45, and substitute a dilution of 1/2. Thus a series of dilutions as 1/2, 1/8, and 1/32 would be more valuable than a series 1/5, 1/15, and 1/45.

CONCLUSION

The sensitiveness of the Wassermann reaction has been increased by using a serum dilution of 1/2 as compared with 1/5. There appeared to be no reduction in the specificity of the test by this procedure.

I wish to acknowledge the technical assistance given to me by Mr. E. Warburton.

Clinical and Laboratory Notes

A NOTE ON PROF. E. LOEWENSTEIN'S BLOOD CULTURES OF TUBERCLE BACILLI

BY A. STANLEY GRIFFITH, M.D. VICT., PH.D. CAMB.
MEMBER OF THE SCIENTIFIC STAFF, MEDICAL RESEARCH COUNCIL

THE claim of Loewenstein to have demonstrated tubercle bacilli in the blood of a high proportion of persons suffering either from tuberculosis or from certain other affections hitherto regarded as non-tuberculous has been contested on the ground that the acid-fast bacilli found in the culture tubes were not, except in relatively few instances, unequivocally identified as tubercle bacilli.

I therefore asked Prof. Loewenstein in March, 1932, if he would send me for investigation a series of his recent blood cultures. He very kindly supplied me with 24 strains, 18 of which were primary cultures obtained in February and March of that year. The remainder were subcultures of strains dating from 1930 and 1931. The clinical diagnoses of the diseases of the patients from whom the cultures were derived were skin tuberculosis (11 cases), polyarticular rheumatism (8 cases), disseminated sclerosis (2 cases), and dementia præcox, renal tuberculosis, and phthisis pulmonalis (each 1 case).

The appearance of the primary cultures was remarkable for the numbers of colonies, which in most of the tubes were set almost as closely as possible. The growths resembled those of primary cultures made from a tuberculous caseating gland of a guinea-pig. The colonies were dome-shaped, greyish-white or creamy, with dry granular surface and narrow grey margin, and on emulsification formed a granular suspension. On the other hand, the growths of the strains which had been subcultured in Vienna were moist and emulsified readily. Four of the cultures on microscopical examination were seen to be contaminated. They were freed from the contaminants by treatment with sulphuric acid (one strain) or by passage through the guinea-pig (three strains).

The results of my tests upon the strains in regard to their cultural characters and their virulence for certain species of animals are as follows.

Cultural Characters.—Seventeen of the strains, all of which were in primary culture when received, produced on the differential media the dry luxuriant growths of the eugonic human type of tubercle bacillus. The growths of the remaining seven strains were moist and slimy.

Virulence.—A little of each culture, with one exception, was inoculated subcutaneously into a guinea-pig. Of the 23 guinea-pigs, 17 died—or were killed when ill—31 to 142 days after inoculation, and showed general tuberculosis resembling that usually produced by tubercle bacilli of the human type. The strains with which these 17 guinea-pigs were inoculated were those with the cultural characters of the human type of tubercle bacillus. The remaining 6 guinea-pigs, all of which had been inoculated with moist slimy subcultures, were free from generalised tuberculous lesions when they died (one, in 45 days) or were killed 91 to 132 days after inoculation. The autopsies showed no lesions in two guinea-pigs, and small purulent foci locally or in the adjacent glands in four.

In order to ascertain whether or not these six strains were of the avian type, each was inoculated intramuscularly into a fowl in a dose of from 10 to 20 mg. All the fowls died of general tuberculosis, the duration of life ranging from 28 to 69 days, average 52 days. The livers and spleens were closely beset with tubercles in which acid-fast bacilli were very numerous. These six strains therefore exhibited the cultural characters and virulence of the typical avian tubercle bacillus. The strain which was not tested as to its virulence had been obtained by Loewenstein through the fowl; it showed the typical cultural characters of the avian type of tubercle bacillus.

The clinical conditions with which these seven avian strains were associated were skin tuberculosis (4 cases), rheumatism (2 cases), and renal tuberculosis (1 case). In Great Britain it may be mentioned avian tubercle bacilli have not been found in any case of human tuberculosis, though upwards of 5000 cases have now been examined.

CONCLUSIONS

1. All the acid-fast strains, 24 in number, sent to me by Prof. Loewenstein, and found by him in direct cultures from human blood, were typical tubercle bacilli.
2. Of the 24 strains, 17 were culturally and in virulence for the guinea-pig identical with eugonic human tubercle bacilli, and 7 were typical avian strains.
3. There was no evidence in any of the cultures of the presence of acid-fast bacilli other than tubercle bacilli.

A RUBBER BAND INSERTED IN THE BLADDER

BY H. NEVILLE TAYLOR, M.A. CAMB.,
M.D. DUB., F.R.C.S. EDIN.
SURGEON TO THE EBBW VALE AND OAKDALE HOSPITALS

TOWARDS the end of last year a man, aged 21, was sent to me by his panel doctor with a history of having inserted a rubber band down the urethra into his bladder. There was a slight urethral discharge, and being sceptical as to the possibility of inserting a thin rubber band into the bladder per urethram, and knowing the various attempts which are made to explain a Neisserian infection, I thought that perhaps the patient might be suffering from a slight attack of gonorrhœa. However, microscopical evidence was negative.

At another interview he persisted in his story, so I made arrangements to examine him with the cystoscope, and at that examination I discovered a thin square section rubber band, divided and doubled on itself (as shown in the photograph) slightly covered with phosphatic deposit—just above the orifice of the right ureter. This I removed by a suprapubic cystotomy and the patient made an uneventful recovery.

Elastic band removed from bladder. (Actual size.)

He steadily and strenuously denied having used anything in the shape of an instrument to facilitate the passage of the band, and I am at a loss to understand how this thin strand of rubber could have arrived in the position in which I found it. Mr. H. Chitty, of the Bristol Royal Infirmary, to whom I showed the specimen, told me of a case in which a boy passed a considerable quantity of thin copper wire into his bladder, and then, getting alarmed, attempted to withdraw it. The wire snapped off and formed a nucleus for a calculus which Mr. Chitty subsequently removed. But a wire, as Mr. Chitty agreed, is a very different proposition to a soft elastic band.

A CASE OF PLACENTA PRÆVIA

By G. K. Thornton, M.B. Camb.

I was engaged during January, 1933, to attend, for her second confinement, a healthy woman, aged 31. The first confinement, in 1930, had been perfectly normal, and her periods continued regularly, the last beginning on Sept. 28th, 1932.

I was called on Feb. 18th, 1933, because she had lost about 2 oz. of blood per vaginam. The cervix was not patent, and expectant treatment was instituted. She continued to lose small quantities of blood for a week, and after she had been free from hæmorrhages for several days, she gradually resumed her housework. Pregnancy continued normally, and labour pains began at 6 P.M. on June 26th. I was called at 10 P.M., by which time she was having strong pains at three or four minutes' interval.

On abdominal examination I found that the fœtus was small and the presentation a vertex, with the head beginning to engage, but not deep in the pelvis. The membranes had not ruptured, and on vaginal examination I found the cervix about "two shillings" dilated; no bag of waters could be felt, and, instead, a mass with the typical feeling of placental tissue was palpated. I made a diagnosis of placenta prævia, and arranged for the patient's immediate removal to Tunbridge Wells Hospital, where I was met in consultation by Dr. C. A. Horder. By the time of arrival in hospital, the fœtal head had sunk low in the pelvis, and as there had been no hæmorrhage Dr. Horder advised leaving the patient under observation, in hopes of a normal delivery. Good pains continued, and a vigorous male infant, 4½ lb. in weight, was born at 1 A.M.

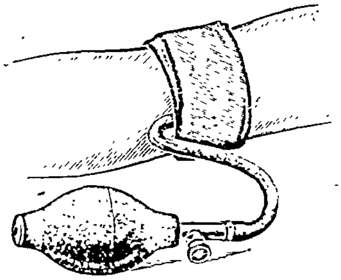
The placenta followed 15 minutes later and, on examination, it was found that there was a mass of devitalised placental tissue, about 2½ in. in diameter, attached to the main mass by thrombosed blood-vessels. The accessory placental mass was very little less in thickness than the main one, and on palpation was indistinguishable from it. As there was even less than the usual amount of hæmorrhage during labour, it seems probable that the devitalised mass had presented in advance of the head, and was either actually a succenturiate-placenta or a detached portion of a normal placenta, the separation of which from the uterine wall had been the cause of the hæmorrhage during pregnancy.

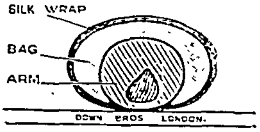
My thanks are due to Dr. Horder for his assistance and for permission to publish these notes.

NEW INVENTIONS

A PNEUMATIC TOURNIQUET

I have devised a small pneumatic tourniquet for intravenous injections. As will be seen from the illustration this consists of a rubber inflation bag less than 5 in. long and under 2 in. wide; 1 in. from one end is attached a piece of rubber tubing to which a small inflating ball with control valve is connected. The inflation bag, which lies flat when deflated, is contained in a washable cloth armlet, 36 in. in length and tapering to ½ in. at the tail end. The bag is placed very loosely over the front of the upper arm just above the bend of the elbow (see Figure) with the inflation ball lying laterally on a pillow on which the elbow rests. The armband is wrapped over the bag as with a bandage, the last 2 or 3 in. being tucked into the final fold. The screw of the control valve is closed and the bag inflated. The needle is introduced into the vein and the valve then opened. Deflation is almost immediate and the injection is made with the appliance still in position, where it remains until the operation is completed. The appliance is small and extremely simple to use; injection can be made without any adjustment of the bag after application, and a further advantage claimed is that as the rubber bag is limited in position to the front of the arm no movement of the limb is associated with deflation.





The tourniquet has been made by Messrs. Down Bros., Ltd., St. Thomas's-street, London, S.E.

H. C. Sinderson, M.D., F.R.C.P. Edin.
Bagdad.

Paying Patients at Warrington.—The final portion of the extension scheme of Warrington Infirmary has now been completed by the provision of a private nursing-home. At a cost of £12,000 the old nurses' home has been converted to accommodate 25 patients, seven in two semi-private wards and the remainder in private ones, and the converted building was recently opened by Lady Daresbury, the wife of the president of the hospital.

BRITISH MEDICAL ASSOCIATION

ANNUAL MEETING IN DUBLIN

SECTION OF OBSTETRICS AND GYNÆCOLOGY

AT a meeting of this section, with Miss ALICE BLOOMFIELD, vice-president, in the chair, a discussion on

Gynæcological Aspects of Endocrinology

was opened by Dr. EMIL NOVAK (Baltimore). Not until 1899, he said, was it established that the essential rôle of the ovaries depended on their internal secretion—though ovarian preparations had been fed to patients before this time on an assumed analogy with the thyroid. In 1903 Fraenkel drew attention to the importance of the corpus luteum in maintaining gestation, and later correlative studies of the ovarian and uterine cyclical changes were undertaken. It was nowadays accepted that the ovary produced two hormones. Folliculin (also called œstrin, theelin, and menformon) was the hormone of the active Graafian follicle. With the rupture of the follicle the luteal phase of the cycle began, the corpus luteum producing two hormones, folliculin and progestin. Folliculin was therefore produced throughout the ovarian cycle, progestin only after ovulation. The folliculin secreted by the Graafian follicle caused hyperæmia and growth of the uterine endometrium and musculature. Progestin was responsible for the secretory activity of the glandular epithelium of the uterus, which was never seen before ovulation. Doubt had arisen of late years about the relation between ovulation and menstruation. It had been shown that typical periodic bleeding, menstrual in the clinical sense, might occur without ovulation during the summer months, but this was not accompanied by the endometrial changes of genuine menstruation. Similar bleeding occurred in cases of functional menorrhagia in women, in which corpora lutea were characteristically absent, and sterility in apparently normal women might be due to failure of ovulation. In order to investigate this, a small piece of endometrium could be taken just before a menstrual period; if there were no signs of secretion in the glands the patient was not giving off ova. When the corpus luteum began to degenerate the endometrium was cast off and menstrual bleeding started. In a woman suffering from amenorrhœa, bleeding could be induced by large injections of folliculin, though it did not appear until some days after the injections had been stopped. It seemed that the withdrawal of folliculin was the cause of menstrual bleeding.

The structure governing pelvic changes was the anterior lobe of the pituitary. Zondek thought that two separate hormones were produced there, prolan A, responsible for the ripening of ovarian follicles, and prolan B, concerned with luteinisation and the formation of progestin. These might or might not be identical with the hormones found in the urine of pregnant women. The results of gynæcological organotherapy had been disappointing. In amenorrhœa of endocrine origin theelin could be given in large doses without re-establishing the menstrual cycle. Though it might possibly cause uterine bleeding, this was not true uterine bleeding; there was no endometrial change, and it was not associated with ovulation. The treatment of functional uterine bleeding with the prolan B principle from the urine of pregnant women was more promising, and would effectively control abnormal bleeding at puberty and the menopause. Dr. Novak also referred to the value of prolan-containing preparations in the treatment of primary dysmenorrhœa, and to the hypodermic administration of folliculin to control vasomotor symptoms at the menopause.

Prof. R. W. JOHNSTONE (Edinburgh) said that the Aschheim-Zondek test had done more than any other discovery to stimulate research in gynæcological endocrinology. At the Pregnancy Diagnosis Station associated with Edinburgh University a degree of accuracy amounting to 99·11 per cent. had been attained with this test. Negative errors not infrequently arose, however, in cases which subsequently aborted, and he and his co-workers had successfully treated [1] cases of habitual abortion with luteinising doses of "rho factors"—as they preferred to call the hormones obtained from the urine of pregnant women. The fears of excessive luteinisation expressed in a leading article in THE LANCET were unwarrantably exaggerated. The quantities injected were vastly less than the quantities of the same hormones excreted in normal pregnancy.

The bulk of the evidence suggested that the normal onset of menstrual bleeding was due to the withdrawal of hormones rather than to the introduction of a bleeding factor, and most observers now regarded the withdrawal of œstrin as the cause. Experiments by Smith and Engle upon monkeys, however, seemed to indicate that the actual cause of bleeding might be the withdrawal of progestin by regression of the corpus luteum. Investigation of several hundred cases had shown that amenorrhœa in non-pregnant women might be associated with either an excess or a deficiency of œstrin in the urine, while irregular bleeding might occur in women whose urine was almost devoid of œstrin. He was dismayed at the indiscriminate use of endocrine substances in treatment. The hormone of any endocrine gland was incapable of stimulating its parent gland, so that hormone therapy was essentially substitutive; but the hormone of one gland might stimulate another. It was not rational to inject a hormone unless there was evidence that the natural supply was deficient, and he urged that the patient's urine should be sent to a laboratory such as that at Edinburgh, for investigation of its hormone content (as far as that was possible) before treatment was undertaken.

Endocrine treatment of primary amenorrhœa had proved disappointing, possibly because it depended on an intrinsic anterior pituitary deficiency. Secondary amenorrhœas, when due to a minor disturbance of function, were sometimes successfully treated by rho I (prolan A) or by œstrin. In functional bleeding at puberty one or two striking successes had been obtained with luteinising doses of anterior pituitary hormones, and he could confirm Novak's results of similar treatment in bleeding of the metropathia-hæmorrhagica type. Radium, however, gave the speediest method of cure in cases of this kind occurring at the menopause. Before administration, sex hormones, like the artist's paints, should be "mixed with brains."

Mr. B. P. WIESNER, Ph.D. (Edinburgh), said that the failure to achieve results with hormone therapy was due to our failure to recognise the complexity of the subject. There were at least two anterior lobe factors regulating ovarian functions, and possibly three or four, and the reactor factors were still to be studied. In many cases ovarian and anterior lobe substances failed to produce results, not through any essential mistake in the treatment but owing to defects in the preparations used. About half the specimens sent for examination at the Pregnancy Diagnosis Station came from non-pregnant women, and nearly all of these were sent on account of amenorrhœa. Workers at the Centre were willing to give information about the hormone content of the urine in these and other cases, in return for clinical details from which statistics could be compiled.

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[1] THE LANCET, 1932, ii., 509, 525.

Mr. D. J. CANNON (Kildare) said that functional endocrine bleeding was of great interest to the gynæcologist. Prof. Johnstone had emphasised the withdrawal theory of the cause of uterine bleeding, but Mr. Cannon preferred to believe that the bleeding was due to the stimulus of a hormone formed outside the ovary but probably acting in association with the ovarian hormones. In metropathia hæmorrhagica the endometrium underwent hyperplasia, and corpora lutea were absent. What was the significance of periodic bleeding in such cases? Last year he had seen a case of metropathia hæmorrhagica associated with dysmenorrhœa, which he had held to be due to a primary disturbance of the nervous mechanism, and had treated by resection of the sympathetic nerve supply.

Dr. N. McI. FALKINER (Dublin) showed slides of corpora lutea removed at different stages of the menstrual cycle; vascular engorgement of the corpus luteum occurred just before menstruation, followed by hæmorrhage into the cavity coincident with the onset of menstrual bleeding in the uterus.

Mr. L. CARNAC RIVETT thought that a link was missing in the chain of events which accounted for the menstrual cycle, and that this might be supplied by a hormone elaborated in the mature endometrial glands.

Lieut.-Colonel SMITH, I.M.S., would have liked to hear something of the relationship between hæmorrhage at the climacteric and congestion followed by erosion and leading on to cancer. He had recently treated with thyroid a man of a corresponding period of life who had early prostatic enlargement with the beginnings of residual urine. This man, who had weighed 16 st. in his youth, had gone up to 19 st. during recent years. On thyroid his weight steadily fell to 16 st., and his prostatic symptoms disappeared.

Dame LOUISE MCILROY referred to the importance of calcium metabolism. In many phthisical cases, she said, amenorrhœa was present because nature found it necessary to conserve calcium which was needed to repair the injury to the lungs. In these cases it was undesirable to restore menstruation. She used corpus luteum extract and thyroid, usually with potassium chlorate, as a routine measure in cases of recurrent abortion, with good effects.

Dr. NOVAK, in reply, said that in his own work he had not observed that bleeding occurred in the corpus luteum at the time of the menstrual flow. He thought ovarian extracts given by mouth had no particular value, nor had anterior lobe preparations. The mechanism of functional uterine bleeding depended, he considered, on the persistence of an unruptured follicle in the ovary; folliculin was thrown into the circulation and continued to be secreted, causing an increasing proliferation of the endometrium. Then, for some reason—possibly a shutting down of anterior lobe secretion—the secretion of folliculin was interrupted, and uterine bleeding followed. These cases were benefited by luteinising hormone, and this treatment would tide adolescent patients over until the natural endocrine equilibrium was established.

THE FRIEDMAN TEST

Dr. P. M. F. BISHOP spoke of the value of Friedman's modification of the Aschheim-Zondek test. The advantages were: (1) detoxication of the urine was unnecessary; (2) one adult doe rabbit replaced the five mice of between 21 and 24 days' old used in the Aschheim-Zondek test; (3) only one intravenous injection of 10 c.cm. was necessary instead of 30 subcutaneous injections given over a period of 3 days; (4) the fate of the animal was laparotomy instead of autopsy; (5) the result was obtained by macroscopic examination of the ovaries at laparotomy, 36 hours after giving the injection, whereas in the Aschheim-Zondek test the results were obtained at autopsy, after 100 hours, by examination with a hand lens confirmed by microscopic examination. As an effective technique he advised that the rabbit should be segregated for 24 hours, laparotomy then being performed and the ovaries being examined. The urine for diagnosis was injected intravenously, and at the end of 36 hours a second laparotomy was performed. If corpora hæmorrhagica were present, the result was positive; if not, the urine of a woman known to be pregnant was injected and a third laparotomy was performed at the end of a further 36 hours. If the ovaries were still unchanged, the test was repeated again from the outset on another rabbit. In a series of 104 cases examined in this way, Dr. Bishop had had no errors of diagnosis; 47 had been positive and 57 negative and all had been confirmed clinically.

SECTION OF PUBLIC HEALTH

AT a meeting of this section Dr. W. M. FRAZER (Liverpool), who presided, introduced a discussion on

National Health Policy

with a summary of the B.M.A. proposals of August, 1930, for a general medical service, which covered the whole of the medical needs of every class of the community, for both home and institutional treatment.

Dr. J. L. BROWNLIE (Edinburgh) followed with a review of the aims, achievements, and organisation of public health work. He did not disguise the facts that the results had fallen short of their hopes, and that both the insurance service and medical curriculum had been objects of criticism, which had some foundation in that too much attention had been directed to end-results instead of to the beginnings of disease. Whilst there was satisfaction in reduced mortality-rates, the morbidity from influenza, minor respiratory affections, rheumatic conditions, and digestive disorders still accounted for much disablement and called for preventive measures. Moreover defects in the insurance service were evident in the lack of diagnostic facilities and in the little achieved on the preventive side—shortcomings, he remarked, common alike to medical training, research work, hospital and health services, which were all too much devoted to postponing death rather than to the promotion of healthy living. In the public health services, whose history had been dominated by the idea of prevention linked with the relief of poverty, and more lately combined with social legislation for insurance, maternity and child welfare, and control of tuberculosis, there had been too great a tendency to divert attention from prevention to treatment, and perhaps some too indiscriminate philanthropy in child welfare work. He recalled the reproach to the services in the persistent high maternal mortality from childbirth. He admitted defective organisation resulting in the separation of family practitioner from public health services, which the B.M.A. scheme strove to remedy, and the need for change in the training of the practitioner before he could take his share in a policy directed to the prevention of disease and the securing of healthy living. The fact that there had been no definition of those aims and a lack of unity in organisation was, he said, due to the haphazard growth of the health services, resulting in a mass of incoördinate activities in which individual workers were not bound together by any common purpose.

Dr. E. H. H. MILLIGAN (Glossop) agreed that the national health policy had not been sufficiently linked with preventive medicine, and that closer alliance was needed between the means of preventing the onset of disease and the aim of curative medicine to delay death. Although the functions of the health insurance body placed an obligation on sanitary authorities to exercise their powers, the remedy was to be found by imposing the work of national insurance on the local sanitary authority. Central coördination there might be at the Ministry of Health, but at the periphery there was a lack of coöperation in dealing with such questions as nutritional and rheumatic disorders. In order fully to mobilise the forces of the profession, he advocated an advisory committee consisting of local divisions of the B.M.A. to assist the local health authorities.

Dr. MAITLAND RADFORD (Shoreditch) expressed his belief in the importance of attention to fundamental requirements, but, as with the problem of industrial produce, the issue was the inadequacy of purchasing power, which checked and diverted progress in public health work. Rapid and unplanned building, he said, had led to slum development, with its inevitable high infant mortality and still higher child morbidity. In helping to remedy those evils the child welfare movement in Shoreditch had achieved much success by educational work which had reached a thwarted maternal instinct. Much attention too, he said, had been given to dental treatment in the borough, where free facilities were open to those unable to afford the cost, and the preventive results had had a good effect in checking arthritic changes in those over 40, who, but for such help, were debarred by economic conditions from obtaining necessary attention. In Shoreditch there was much overcrowding in poor buildings, and no means had yet been found to relieve the worker who could not afford improved accommodation. The Rent Restrictions Act had checked the sweeping away of the slums, and so deflected a much needed public health measure. Among what he called environmental drawbacks was the poverty of mothers, which had compelled the giving away of milk in large quantities.

Dr. C. BASTIBLE (Wexford Co.) attributed the lack of progress in national health policy to concentration on unessentials, and too little teaching of the normal processes of health, and of variations from the normal which would open a vista of new lines of preventive treatment as shown, e.g., by orthopædics in the correction of small defects. The practical application of preventive medicine was a later development which called for State-aided post-graduate teaching, such as existed in Denmark, whereby the practitioner could keep abreast of that advance and maintain closer touch with hospital work. In Ireland, he said, dispensary and public health services afforded an important link, which was missing in the British health services, where the lack of coöperation of preventive and curative medicine made the union of the two more difficult under the national insurance scheme. On the other hand, accurate record keeping in England provided advantages which would be welcomed in Ireland. Intense organisation, he thought, tended to discourage individual observation and effort, which must be allotted a place in preventive medicine. Mental diseases, fostered by anxiety, worry, and overwork, were a great drain on the health services, and the prevention of insanity still awaited solution. The supervision of dairies had contributed little to the overcoming of tuberculosis. There was, however, no certainty that a national health policy suitable in one country would be equally so in another; Ireland being more rural than England, the solution of her needs was much more difficult.

Prof. C. A. BENTLEY (Cairo) quoted the aphorism that "public health is purchasable," and referred to health expenditure in Bengal, where ½d. per head of population was allotted to health services out of 2s. 6d. for all purposes. Before deciding what public health work should be dispensed with, fundamental requirements should be thoroughly surveyed.

Dr. D. MCKAIL (Glasgow) said it was important to focus attention on the assessment of possibilities in public health work, and observation of what others had been attempting. He suggested that the time had come for an extension of national health powers to allow the initiation of schemes to meet local needs which had been frustrated by local inertia causing postponement of such necessary work as slum clearance. Central authorities should be able to get ahead.

Enteric Bacilli in Sewage and Water

Prof. W. J. WILSON (Belfast) referred to Belfast's past typhoid fever record, which had been a byword 40 years ago with an annual mortality of 500 deaths. The improvement now shown in the reduction to only one or two deaths a year had, he said, taken place at a later date than in the large towns of England. He named two great pioneers who had been responsible for that progress. Budd, who in 1856 had claimed that through specific organisms in the excreta infection was conveyed by sewage; and Murchison, who had held that organisms might arise from putrefaction and that disease arose de novo from imperfect sanitation. The truth however lay between the two. In the growth of the prevention of disease, England had followed the general lines of improved housing and sanitation and pure water-supplies, long before bacteriology had been able to assign the actual cause of typhoid fever. To-day they were reaping the fruits of the sound sanitary improvements installed years ago. Bacteriologists had found the viability of the typhoid bacillus to last for four or five days in sewage-infected water, which showed the possibility of outbreaks of enteric fever arising from water pollution. It was only in 1928 that he had been able himself to isolate typhoid bacilli from so small a quantity as 1 c.cm. of sewage, as well as from the droppings of seagulls. Gray had isolated paratyphoid bacilli from Edinburgh sewage, and Houston had found typhoid bacilli in Thames water. The typhoid bacillus, he said, was far more widespread in their immediate environment than had been thought. In his 1930 report on the Epping paratyphoid outbreak, Houston had shown that crude sewage yielded thousands of *B. paratyphosus*, and large numbers had been found in the brook above the intake of London's water-supply. There was, he thought, a foundation of truth in Murchison's old belief; for in every typhoid epidemic bacilli were probably derived rather from the many healthy carriers than from actual cases. The use of a malachite green culture medium had facilitated the detection and isolation of bacilli of the enteric group, and, as Dr. H. M. Scott of the Ministry of Health had shown, also of those associated with food poisoning, such as *B. ærtrycke* and *enteritidis*.

Prof. W. D. O'Kelly (Dublin) concurred in the possible truth of Murchison's views, which he placed on a par with the shrewdness of Sydenham's belief in epidemic constitutions. He said that the more precise methods now employed for the detection of the typhoid bacillus had greatly increased the chance of its discovery, but much had yet to be learnt about the dosage of infection causing attack, the virulence of the organism, and individual resistance. Herd immunity also opened a wide field of research. The full importance of sanitary work accomplished before the days of bacteriology should not be forgotten.

Dr. Brownlie regarded the typhoid carrier condition as a serious problem in view of the omnipresence of the organism, against which the action of bacteriophage might be investigated as a possible means of defence.

Prof. Wilson, in reply, pointed out the serious lack of knowledge in their inability to ascertain the virulence of the typhoid bacillus, and whether a person was a carrier of infective germs. He asked how the carrier was to be controlled when he was not notified and usually disappeared, only to be recognised when another outbreak occurred. Removal of the gall-bladder, which had been adopted as treatment of the carrier condition, was, he thought, not justifiable. The possible value of bacteriophage was worth study, and he mentioned the limited value of intestinal disinfectants. He advocated the education of the public in practical hygiene, such as washing of the hands after defæcation, the free provision of such facilities in public lavatories, as well as personal cleanliness of those engaged in preparation of food. That there was not more typhoid fever, in spite of so many carriers in the population, he attributed to the influence of herd immunity.

REVIEWS AND NOTICES OF BOOKS

Principles and Practice of Obstetrics

Sixth edition. By Joseph B. DeLee, A.M., M.D., Professor of Obstetrics and Gynecology at the University of Chicago. London: W. B. Saunders Co., Ltd. 1933. Pp. 1165. 60*s*.

It is pleasing to read a new edition of a standard text-book which keeps well abreast of current thought. The early editions of DeLee's text-book were not held in very high regard in this country because they were obviously modelled upon the German text-books, and such contributions as his obstetric stethoscope did not seem to add a great deal to the practical side. The new edition is much better. The illustrations, numbering 1221, are now as satisfactory as illustrations can be. One conspicuous merit of the book is its reference to current literature; DeLee himself keeps carefully in touch with modern work, and forms his own shrewd opinion of what is important amongst the recent contributions. But he is not a stylist, and his work does unfortunately lay itself open to the popular gibe of careless composition amongst scientific workers. The reader will nevertheless be grateful for his trenchant criticism and outspoken comment. For example, on p. 1014 appear these words: "There appears in Buffalo an interesting figure [name given] . . . Except those few cases where the baby is born before he arrives he delivers all women by Cæsarean section or podalic version and immediate extraction. . . With this exception his principles of practice are condemnable in every way, being, in my opinion, unscientific and misleading and dangerous to both mothers and babies." His remarks on mortality from puerperal sepsis (p. 945) are illuminating. In the new edition several chapters have been rewritten, and a short account of the Aschheim-Zondek test has been included. Three pages of obstetric chronology have been added at the end of the book.

DeLee's book is essentially a work of reference. It is too big to be used as a text-book by the average student. The amount of information it contains is remarkable, and there are few aspects of the subject which are not mentioned.

Ten Years of Obstetrics and Gynecology in Private Practice

By John L. Rothrock, A.B., M.D., F.A.C.S., formerly Associate Professor of Obstetrics and Gynecology, University of Minnesota, &c. New York: Paul B. Hoeber. 1933. Pp. 209. $3.

This monograph contains a report of 1750 obstetrical and 1345 gynæcological cases obtained from the private practice of the author during a period of ten years. The prime object of the report is to give the results of cases treated in private practice, but as almost all cases were treated in hospitals they should be regarded rather as hospital cases especially supervised. The obstetrical results are extremely good, the maternal mortality being 2·8 per 1000 births, which compares favourably with the average maternal mortality of the United States. In addition to the statistics there are short chapters indicating the principles of treatment which have been followed, and the style here is rather that of Smellie's note book. The author has much faith in Kielland's forceps, and it is remarkable that 95 of the 1750 patients were delivered by Cæsarean section.

Natural Childbirth

By Grantly Dick Read, M.A., M.D. Camb. London: William Heinemann. 1933. Pp. 127. 7*s*. 6*d*.

Dr. Dick Read has performed a service in calling attention to the curious attitude towards childbirth which is developing in a large number of women. Nowadays there is a tendency for old wives' tales of difficult confinements to be discussed in the presence of young women; frequently these tales are combined with good fishing stories of the weights of the babies, with the result that many young women regard childbirth with undue fear. Similarly, as Dr. Read very rightly insists, many expectant mothers are apt to look forward to parturition as a fertile source of sympathy, and this peculiar craving for sympathy is by no means restricted to the hospital class. The author suggests that such factors as these are partly responsible for the behaviour of some women during childbirth. In this way, he explains long and difficult first stages when the mother seems burdened with anxiety and is distressed more than clinical findings can explain. The author maintains that much can be done by ridding women of these fears, and his case is stated convincingly. One of the most interesting suggestions made is that post-partum hæmorrhage is never seen if the mother hears the baby's cry, and he suggests that some mechanism exists whereby contractions of the uterus are induced when the mother realises that the delivery is accomplished.

Paralysis in Children

By R. G. Gordon, M.D., D.Sc., F.R.C.P. Edin., Physician, Bath and Wessex Orthopædic Hospital; and M. Forrester-Brown, M.D., M.S. Lond., Surgeon to the Hospital. London: Humphrey Milford, Oxford University Press. 1933. Pp. 328. 15*s.*

The first part of this readable and attractive volume is devoted to the physiology of movement and the interpretation of physical signs, and is illustrated by numerous diagrams of the nervous system. The second part contains an account of almost all the disorders of childhood which may cause impairment of muscular power; many of these are referred to quite briefly, but important diseases such as poliomyelitis and the spastic paralyses are considered at some length. The final section of the book deals with treatment. The reader will be impressed by the ideal conditions under which Dr. Gordon and Miss Forrester-Brown have been able to do their work. They have had the use of a hot pool bath fitted with appliances for exercises, in which children can play about. For lesions of the upper motor neurone this is regarded as the treatment of choice, while whirlpool limb baths are also used. The indications and contra-indications for massage and electricity are admirably discussed; stress is laid on the fact, so often overlooked, that both these measures are harmful in spastic conditions. The danger of electrical stimulation in inflammatory lesions of the lower motor neurone before the residual stage is also emphasised. Electricity is regarded as playing a very minor part in the treatment of flaccid paralysis and none at all in that of spastic conditions. A full account is given of re-education exercises for individual muscles. Orthopædic operations are summarised and their indications discussed, but they are not described in detail. Stoeffel's operation is not favoured, since the authors found it to be followed by much fibrosis in the denervated muscles.

The great merit of the book lies in the fact that it is the outcome of that close coöperation between the neurologist and the orthopædic surgeon which is essential to the successful treatment of paralysed children. It should be of interest and help both to practitioners and to those whose work lies in children's institutions.

Hæmorrhoids

The Cure of Hæmorrhoids, Varicose Veins and Ulceration, and Allied Conditions by Modern Methods of Injection and Bandaging. By Stuart McAusland, M.D., M.R.C.S. Eng. London: John Bale, Sons and Danielsson, Ltd. 1933. Pp. 63. 3*s.* 6*d.*

In this small book is summarised Dr. McAusland's experience in the treatment of 1000 cases of hæmorrhoids and 3000 cases of varicose veins during the past 11 years. Its scheme and details are essentially practical, but like most books dealing with injection treatment it approaches the subject mainly from the point of view of a single therapeutic measure. If there is little that is new in the work, there is also little matter for criticism. For varicose veins injections are started proximally, in a manner comparable with the old ligature operation. Dr. McAusland remarks that "this reduces the lower varicose veins to almost normal proportions, and renders further injections almost unnecessary"—a statement which contains its own refutation. If lower varicose veins demand treatment they should be treated first, since after the main internal saphenous vein is injected they become much smaller and far more difficult to enter, though still varicose. It is impossible to justify dogmatic statements on the relation of phlebitis in varicose veins to simple thrombosis, and on that of bacterial infection to both these conditions, though it must be admitted that in cases of superficial thrombosis or phlebitis a fatal accident from pulmonary embolus is very rare. As regards the treatment of these cases, many of them resolve rapidly in the absence of any special treatment, many are assisted by the use of elastoplast bandages or supports, and others only clear up with complete rest in bed.

The section on the injection treatment of hæmorrhoids is good, and the book as a whole is clearly written.

Chirurgie de la main

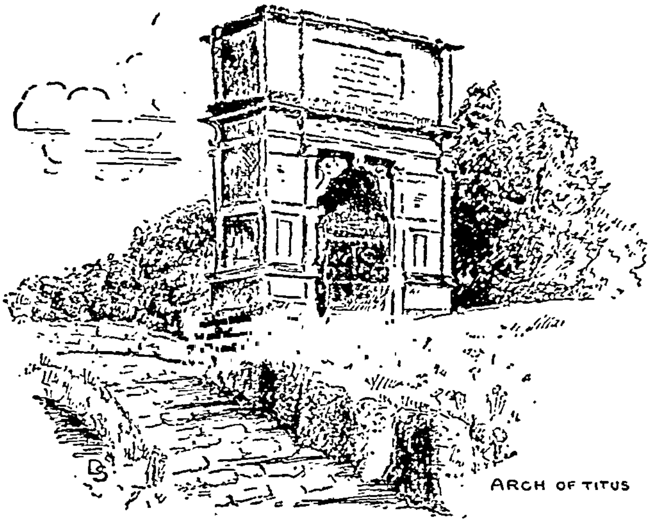
(*Plaies, Infections, Chirurgie Réparatrice*). By Marc Iselin, Ancien Interne des Hôpitaux. Paris: Masson et Cie. 1933. Pp. 339. Fr.55.

Surgery of the hand has for too long been relegated largely to the care of juniors in the out-patient department, but is gradually attaining an importance much overdue. Dr. Iselin's book is an excellent survey of wounds and infections of the hand and of the reparative surgery which these demand. Seventy-four pages are devoted to wounds and to a study of the treatment that is most likely to produce a good physiological result in relation to the patient's occupation. Great stress is laid on the risk attending primary suture of a wounded hand, except under the most favourable of circumstances; and evidence is provided to show that primary suture of cut tendons ought hardly ever to be undertaken.

The major part of the book deals with infections. In this section every type of infection is studied in all its aspects, including anatomy, pathology, signs, diagnosis, and treatment. The author recognises at least 21 different anatomical types, and is the first to draw attention to infections of the middle segment of the finger as a separate entity, and to describe a pretendinous palmar infection. His conception of the pathological anatomy of tendon sheath infections is particularly interesting. After a full discussion of the incision recommended by the leading American and German authors, Dr. Iselin explains his own method of choice.

In the third part of the book reparative procedures are described and the treatment of deformities receives full attention. An adequate exposition of the different forms of skin-grafting is supplied and the repair of tendons is described at length. Finally, operations for the reconstitution of the lost thumb are enumerated.

The labelling of Fig. 46 should be adjusted in a future edition as it might confuse the reader. This book is an expansion of a previous monograph published in 1928, but contains so much fresh matter that it may be regarded as a new work.



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THE LANCET

LONDON: SATURDAY, SEPTEMBER 9, 1933

LIFE

We could almost wish that it were the custom for the president of the British Association to resume his address evening after evening until he had emptied himself of what he would like to say, for it is only by some such replica of the Arabian Nights that Sir Gowland Hopkins could possibly have given his audience at Leicester anything like an adequate idea of what he thinks and feels about the fertility and the ramifications of biochemistry. But while we are tantalised by his allusive references to many topics on which we would gladly have heard him further, and must regret that we have never been brought within sight of a good many of the hares which he started, we welcome very gladly his dignified exposition of the purpose of the particular discipline to which he has devoted a fruitful life. The aim of biochemistry, he says, is to give an adequate and acceptable description of the molecular dynamics of living cells and tissues: adequate in that the account shall satisfy our intellectual criteria; acceptable in that it shall satisfy our æsthetic sense for truth and beauty and, with each step achieved, open up to us fresh views of loveliness which we must make for. Modern biochemistry has passed from the stage of identifying and studying the substances of which live organisms are made to the discovery of how they interact with one another and with changes in their environment; it examines what they do as well as what they are. And out of this mode of inquiry two broad facts have emerged. In the first place, chemical changes which seemed at one time to be relatively simple have proved on closer acquaintance to be of unexpected complexity. It used to be thought, for example, that oxygen passed from the blood into an active muscle, took part in something not unlike ordinary combustion which furnished the energy for contraction and came out again as CO_2. It is now known—and for the time at any rate it certainly seems to be true—that the muscle substance itself is only a framework in which compounds of sugar and phosphoric acid break up via glycerin and pyruvic acid to lactic acid, which by oxidation after the active phase is over provides the energy for the synthesis of creatin phosphate, of which the breakdown during the active phase provides the immediate energy of contraction; adenyl pyrophosphate also plays a part in this amazing sequence. And so with other transformations; they have always turned out to be more complicated than workers thought they would be. And in the second place, a better realisation has been achieved of the enormous importance of the catalysts we know as enzymes as activators of chemical change, and particularly of their highly specific character. An enzyme usually has active relations with only one kind of molecule, and on this specific connexion depends the orderly series of consecutive events which characterise biochemical processes; the activity of one enzyme depends on the activity of its predecessor and determines the activity of its successor.

By custom and tradition it would be almost improper for any meeting of the British Association to pass without something being said about the nature of life. Sir Gowland Hopkins is not altogether clear as to what germane deductions on this large question may legitimately be made from the progress of biochemistry. We suspect that in fact he is a little impatient of mystical contemplation, and that he sees no reason why further knowledge of the intimate dynamics of living organisms should leave anything over to be explained. It may be so, and the great advances which have already been made justify almost any dreams of what may be reached in the future. But there is still room for doubt, as is admirably expressed in the address to the section of zoology by Mr. James Gray, Sc.D., reader in experimental zoology at Cambridge. No one who has read his "Experimental Cytology" will suspect Dr. Gray of any disinclination to let chemistry and physics explain all they possibly can. But he warns us to go carefully, not to be too readily satisfied with the artificial pearls of over simplification, and not to think that biochemistry has given us all we need to know about a jumping frog. Going back to the beginning, he questions the spontaneous origin of living from non-living matter which has been assumed so frequently and so glibly. Such an event would, physically speaking, be possible, but it would be improbable to a degree which makes it incredible. Within the physical world all systems move towards the state of greatest probability, and what happens tends to destroy structure rather than elaborate it. There is not the least evidence that, within the physical world, a dynamic machine has ever spontaneously come into existence. It is therefore illogical to think that living has come from non-living matter, and it is more consonant with what we actually know to accept the existence of matter in two states—animate and inanimate—as our initial axiom. It is best, he says, for the biologist to accept the living state as he finds it and study its behaviour, which is what Prof. Lovatt Evans said on a similar occasion a few years ago, and Prof. Niels Bohr has recently repeated.

That a zoologist, a physiologist, and a physicist should concur in such a conclusion is certainly impressive. Theoretically and pragmatically there is much to be said for it. Living organisms may be described in a variety of terms: morphological, physiological, biochemical, and perhaps psychological. And nowadays—the great advance in biology—they are all dynamic as well as static; a living organism is something that does, not only something that is. The descriptions are complementary to one another. When we have them all together, each complete and coherent, shall we know what life is? Perhaps we may; perhaps we shall still be left with the intangible residuum which so many thoughtful biologists dimly see behind their phenomena.

THE RADIOSENSITIVITY OF CELLS

Of late years the biological action of radium has been studied chiefly by means of tissue culture, and this is a method which can be criticised because it involves excessive simplification of environment. The question arises whether its results apply to the cell in its natural physiological state. Using the same technique, Mr. H. G. Crabtree and Dr. W. Cramer[1] have recently been able to show some of the fallacies that may arise, and doubtless have arisen, from it, and have also devised experiments which demonstrate how susceptibility to irradiation can be varied by changes in environment. They have thus confirmed the important fact, brought to light by their earlier work,[2] that susceptibility to irradiation is not a fixed property of any given type of malignant cell.

The starting-point of the new experiments was their observation that the success of transplantation of sections of mouse tumour irradiated in vitro depended on the nature of the saline medium in which they were suspended, and that a primary effect of radiation on cells in vitro was a selective diminution in their respiration. This led them to make a systematic study of effects of changes in environment brought about by substances and conditions known to inhibit metabolism, in order to find out whether radiosensitivity could thereby be enhanced. In the first place the effects of these substances and conditions had to be examined quantitatively so that the limits might be found within which any actions were reversible—that is to say, the point had to be discovered at which change of environment in itself caused permanent damage to metabolism or to viability as tested by transplantation experiments. Among substances tested were hydrocyanic acid which checks respiration, and sodium fluoride and iodoacetic acid which inhibit glycolysis. Among alterations in physiological conditions were anaerobiosis and low temperatures. The standard conditions adopted for comparison were suspension of thin slices of tissue in Warburg's Ringer—glucose—bicarbonate medium with a rapidly passing current of 95 per cent. O_2+5 per cent. CO_2 kept at 37·8° C. In the presence of inhibitors of glycolysis no alteration in sensitivity to coincident radiation with hard β rays and γ rays was found, but any agency which depressed respiration caused a profound change in susceptibility. The effect produced, however, was not always in the same direction. Low temperature, which retards all cell processes including respiration, hydrocyanic acid in suitable dilution, and simple Ringer solution (non-oxygenated, and lacking glucose and bicarbonate) markedly *increased* radiosensitivity, as measured on thin sections of Jensen's rat sarcoma which were subsequently transplanted. Anaerobiosis in a nitrogen atmosphere, on the other hand, greatly *decreased* sensitivity when compared with standard conditions. An examination of the tumour charts included in the paper will show how greatly results can be made to differ by these manipulations in a simple tissue culture container.

It is natural that Crabtree and Cramer should discuss their results in relation to radiotherapy, and although in the human subject neither hydrocyanic acid nor cold can be used to enhance sensitivity their experiments open up a possibility of being able to increase sensitivity by a coincident attack on the oxidative processes of the cell. In this association mention is made of the clinical experience that patients suffering from anæmia do not as a rule react readily to radium, and tumours growing in tissues badly supplied with blood-vessels, such as bone and cartilage, are particularly radioresistant. The inference is that in these cases a resistant state is brought about by oxygen-lack, and so compares with anaerobic tissue cultures. Unfortunately clinical conditions, like clinical experiences of this subject, vary too much and in a manner too little known to view this explanation as more than an interesting suggestion. Of far greater importance to the general thesis that radiosensitivity is not a fixed property of any given type of cell is an observation included in Crabtree and Cramer's paper that cyclical alterations in the biological behaviour of the tumour strain used are accompanied by changes in sensitivity towards short wave radiation. When growth rate is depressed the tumour becomes more radiosensitive, and when it is increased the tumour is resistant. The results of all these experiments indicate that radiosensitivity in vivo depends upon many factors of which the biochemical state of the tissue treated is as important as the nature of the growth and the dosage and distribution of rays.

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[1] Proc. Roy. Soc. B., 1933, cxiii., 226.

[2] Tenth Scientific Report of the Imper. Cancer Research Fund, 1932.

THE RIGHT CEREBRAL HEMISPHERE

The mystery of the relationship between the body and the mind is not diminished by Dr. W. E. Dandy's recently published observations[1] on the effects of extirpation of the right cerebral hemisphere in man. Dandy has removed the entire right cerebral hemisphere from three patients, people in whom this part of the brain was the site of a neoplasm, and one of them survived the operation for two years and two months. Some observations on these patients yielded results which might have been anticipated. There was a complete contralateral hemianopia. It is stated that the sense of smell was unaffected, though this appears to have been tested in only one patient, and that taste was preserved, at least in part. Hearing is said to have been unaltered, a fact which is consistent with the frequent observation that hearing is unaffected by a destructive lesion n the region of the auditory cortex of the right hemisphere. The considerable degree of preservation of voluntary power in the masticatory and facial muscles and in the soft palate and tongue on the side opposite to the lesion might also have been anticipated in view of the well-known fact that the movements of these muscles are bilaterally represented in the motor cortex. The absence of gross sensory disturbances in the trigeminal area on the side opposite to the lesion in two cases is somewhat surprising, especially in view of the abolition of cutaneous sensibility over the rest of that half of the body. Some degree of deep sensibility appears to have been preserved on the paralysed side, and there was slight power of voluntary movement in the lower extremity. The fact that the paralysed muscles remained flaccid is of considerable interest, and suggests that the spasticity commonly associated with hemiplegia due to a lesion of the internal capsule is a manifestation of the functions of regions of the cerebral hemisphere which were removed by DANDY in his operations.

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[1] Bull. Johns Hopkins Hosp., 1933, liii., 31.

Perhaps the greatest interest, however, attaches to DANDY's observation that no detectable mental change was produced by the complete removal of the right cerebral hemisphere. The patient who survived the operation for two years was regarded by his friends as mentally normal. By profession a preacher, he conducted services on Sundays, enjoyed the wireless, and followed the proceedings of the Democratic National Convention more than two years after his operation. DANDY, considering the case from the scientific rather than the clinical aspect, characterises this absence of any mental disturbance as "disappointing." It is certainly surprising, but perhaps both disappointment and surprise imply that the facts observed conflict with certain preconceptions in the observer. Since in all DANDY's cases the right cerebral hemisphere at the time of its removal had been the site of extensive disease, some of its normal functions may by that time have been taken over by the opposite hemisphere. One would probably learn more concerning the functions of the right cerebral hemisphere by observing what mental functions remained after removal of the left than vice versa, but if similar occasion were to arise for removing the left hemisphere the surgeon might yet be deterred by the total aphasia to be anticipated. Possibly, however, the results of complete removal of the left cerebral hemisphere would be as surprising as those which follow removal of the right. In young children the right cerebral hemisphere seems to be capable of taking over some of the normal functions of the left—for example, those concerned in speech, when the left hemisphere is damaged by disease. It may be that such substitutive function of the right hemisphere in the adult is impeded or even altogether prevented by the disordered activity of what remains of the left hemisphere when that is partially destroyed by a lesion, and that after complete removal of the left hemisphere a greater recovery of function might occur than could be expected.

Why two cerebral hemispheres so similar in appearance and structure should differ so greatly in function is still quite unknown. If the left hemisphere, as is generally supposed, contains regions devoted to speech and mental function, what purpose is served by the same regions in the right hemisphere? On the other hand, if the whole of the right hemisphere is concerned with movement and sensibility, is it in the left hemisphere alone that we are to look for the functions of the mind?

ANNOTATIONS

WATER

A LONG dry summer such as the present one causes great anxiety to many water undertakings and much discomfort to communities supplied by them. Still worse is the case of many families dependent on private supplies which even if of satisfactory purity may be of very variable yield. Townspeople who have country bungalows or have spent holidays in rural places must have had the seriousness of the position brought home to them within the last few months. Without some such experience it is difficult to realise that an unlimited supply of water always (literally) on tap is a modern luxury.

Rather over 30 years ago a water shortage in the districts of some of the eight companies which then supplied London was only met by laying emergency mains through the subway tunnel under the Thames, so that the more fortunate companies could assist the others. This was the first striking example of pooling water-supplies. If all resources could thus be pooled, there would be little occasion for local deficiency. At present Manchester for instance finds that the water available for distribution from its vast operations in the Lake District is likely to exceed the local demand, diminished as it has been by depression in industry. There is still also unused water which has not as yet been hopelessly polluted. The Ministry of Health in circular No. 1338 has shown its concern in the matter by urging local authorities to take, where it seems desirable, joint action in the matter; but something more than this seems needed. Surely it would be desirable for some central body to survey the available sources of pure or purifiable water, to earmark those not already used as inviolate from any additional pollution, and to suggest with insistence to local authorities the sort of grouping which would be appropriate. The example of the London companies already quoted has led to the suggestion of applying to the distribution of water something like the "grid" system of distributing electric current. But here it is necessary to guard against looseness of thought. Mains in either case are expensive, it may be prohibitively costly in the case of long connecting water mains; but, whereas the high tension current can be carried in a bee-line over hill and dale, cross-country water mains would mean either tunnelling or the frequent breaking or raising of pressure, the cost of which is hardly to be imagined. Short of this, however, adjacent large centres of population should have some common policy while groups of villages, each having a fair supply, might find it advantageous to link up their sources and reservoirs so that the shallower and more fluctuating ones might bear the burden in normal seasons and the deeper serve as stand-by supplies for dry weather. Mr. Douglas F. Worger, sometime engineer to the Metropolitan Water Board, has described a system of small reservoirs kept at the necessary pressure for delivery by the compression of air and automatically replenished by pumping whenever the pressure falls below the necessary limit. The whole system is self-acting and seems where used to have worked well, but it needs a constant source of supply. It appears adequate for dealing with the rush hours of the day, but for periods of drought additional storage reservoirs would be required.

In any national scheme the question of cost will be a dominant factor, but it must be remembered that the health and the very life of the community depend upon an adequate water-supply. An area might indeed become uninhabitable if the water-supply failed. A disquieting feature of the problem in the metropolis is the falling water level in the chalk under London. As was remarked in *Nature* of June 17th, "Nature, lavish in the provision of underground storage, is much less generous in replenishment, and the whole trend of the modern development of land drainage and similar services is to curtail still further natural replenishment." It has been calculated that only about one-fifth of the world's rainfall reaches the rivers, and it is only by a frugal and far-seeing policy that this modicum of the yield can be made to serve all the requirements of our civilised life. The discomforts of what has not even been meteorologically a "drought" at all will not have been wasted if they result in measures which will suffice to meet a real drought, such as that of 1911 or worse. Meanwhile (see p. 620) the Ministry of Health has issued a memorandum to local authorities whose situation is serious, making suggestions about the conservation of the present supplies and the avoidance of danger to the public health.

USURPING THE AUTHORITY OF THE G.M.C.

ON the third reading of the Salford Corporation Bill at the end of July Dr. W. J. O'Donovan, M.P., made a brief but vigorous protest against the clause which attaches conditions to the conduct of establishments for special treatment by registered medical practitioners. The general provisions of Part VIII. of the Salford Act forbid the use of premises for massage or special treatment—i.e., radiant heat, light, electric, vapour, or other baths for therapeutic treatment—except under licence from the corporation. An exception is made for an establishment carried on by a duly registered medical practitioner, but he must lodge with the licensing body a certificate of suitability signed by two local registered practitioners who must not be in partnership with him or with each other and must not have any financial or other interest in the establishment. A fresh certificate will be required at the end of each calendar year. As Dr. O'Donovan pointed out in the House of Commons, this municipal supervision of the medical profession will, if it goes much further, put the Salford Corporation in the place of the General Medical Council and will invest it with the responsibilities of the colleges of physicians and surgeons which train and certify men as fit to practise medicine.

The text of our Local Acts is seldom readily accessible until several weeks after they have received the Royal assent. The Salford Act (c. lxxxix. of the current session), though passed by Parliament more than a month ago, has only now been published. On being examined, it hardly justifies that part of Dr. O'Donovan's protest in which it was described as introducing an absolutely new principle. The Act follows, almost verbatim, other precedents such as the Surrey County Council Act of 1931, the Manchester Act of 1924, and the London County Council (Various Powers) Act of 1920. Indeed, this group of clauses about the licensing of establishments for massage and special treatment is one of those features which the draftsmen of local legislation profitably copy from one another until it is often hard to name the original example. Whether the clauses be new or old, however, there is solid substance in Dr. O'Donovan's comments. If a duly qualified practitioner is on the Medical Register (a fact easily verified), the General Medical Council's statutory responsibility should furnish sufficient guarantee that he is suitable to have charge of therapeutic treatment in Salford or anywhere else. The municipality would not expect to be given authority to impose conditions on the prescription of dangerous drugs by doctors. Why should there be municipal conditions, however trivial, as to any form of medical treatment by duly qualified practitioners? The clauses in question are directed against two possible abuses. The first of these is the exploitation of the public by unqualified persons; the second, as Section 94 of the Salford Act shows, is the possibility of immorality in bogus massage or other establishments. Hard things are sometimes said of registered medical practitioners, but does any citizen of Salford think so badly of them as that?

PNEUMONIA DUE TO STAPHYLOCOCCI

A PAPER on Primary Staphylococcic Pneumonia, by H. A. Reimann,[1] suggests that this type of pulmonary infection is not uncommon; indeed, he produces evidence that in about 9 per cent. of "atypical" pneumonias—i.e., those not due to type I., II., or III. pneumococcus—the important infective agent is the staphylococcus. The histories of the six new cases he records support the view that this infection often follows influenza or some other similar debilitating condition. It is characterised by the formation of multiple abscesses, going on to cavitation if the patient survives. X ray examination may show the abscesses and cavities from an early stage of the illness, and, combined with the examination of the sputum, will usually establish the diagnosis. The mortality is high and at best it is usually some weeks before the temperature settles. Reimann's paper will, we hope, arouse more interest in the condition, but it is curious that he should make no reference to the possible use of staphylococcal antitoxin. Much work has lately been done on the toxin and antitoxin of staphylococci,[2] but there are few signs that its practical significance is recognised either in America or this country.

A ROOM-SIZED RESPIRATOR

REFERENCE has already been made [3] to the use of the Drinker-Shaw respirator in the treatment of gas poisoning and of anterior poliomyelitis and other diseases in which the respiratory muscles are paralysed. Its construction was also described [4] in some detail by Prof. P. Drinker. Although the more recent models have allowed the patient's position to be changed and essential nursing procedures to be effected without removing the patient from the tank in which all but the head is placed, nursing and examination of the patient have necessarily been carried out under considerable difficulties. Drinker and J. L. Wilson now describe [5] a room-sized respirator in which these difficulties are obviated. The principle is essentially the same as that used in the construction of the smaller model. The patient is placed with the trunk within the respirator, the head passing to the exterior through a rubber collar which fits closely around the neck. By alternation of the pressure within the respirator, the patient's chest can be expanded and compressed, with corresponding inflation and deflation of the lungs. The rate can be varied at will. The present model consists of a chamber sufficiently large to accommodate four patients at once, and into which a nurse or doctor can enter whilst the apparatus is in action. This has the great advantage that nursing can be carried out as efficiently as under ordinary hospital conditions, X ray photographs can be taken if necessary, and the patient can be examined thoroughly and at leisure. The motor is sufficiently far removed from the chamber for there to be no interference with auscultation. Observers within the chamber are conscious of changes in pressure by sensations within the middle ear, which seldom, however, cause any serious inconvenience and are largely done away with by plugging the ears. They do not hinder auscultation. The entrance is by a large door which cannot be opened during the negative pressure phase, and there is in addition a smaller emergency door in case the apparatus should stop during this phase. The authors point out that additional advantages are the lower cost of group treatment in an epidemic, the possibility of carrying out orthopædic treatment and operations (even thoracic surgery at constant or varying negative pressures coming into consideration), and the rapidity with which a case of sudden respiratory failure can be introduced into the apparatus. Up to the present, the respirator has been used for one case of Landry's type of poliomyelitis, two of lead encephalitis with respiratory paralysis, and several other cases of respiratory failure, including one new-born infant. It will be of interest to have a report of group treatment when the next epidemic of poliomyelitis occurs.

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[1] Jour. Amer. Med. Assoc., August 12th, p. 514.

[2] See THE LANCET, 1932, i., 506, 576; 1932, ii., 1019; 1933 i., 922.

[3] THE LANCET, 1932, i., 1211, and ii., 952.

[4] Ibid., 1931, i., 1186.

THE PREVENTIVE TREATMENT OF ANGINA PECTORIS

THE whole problem of angina pectoris has had to be reviewed since the separation as a clinical entity of coronary occlusion from angina of effort. In the continuous treatment of the ordinary common kind of effort angina, in which the underlying pathological process is probably atheroma of the coronary artery system, a large number of drugs have been vaunted. Most of these are known to be of some potency as vasodilators, and the apologia for their use has been that if they cannot dilate the diseased vessel they may at least have some such effect on collateral channels. The efficacy of such drugs during the actual attack is established beyond all question, and is perhaps dependent on relief of an added spasm which occurs at this time. But how far are they really useful as preventives? Little or no scientific work has been done with the object of providing an accurate answer to this question, and it is therefore helpful to have the results of some careful observations by Dr. William Evans and Dr. Clifford Hoyle.[6] The work was carried out on 90 ambulatory hospital patients, and in all a syphilitic ætiology was excluded. The essential criterion of diagnosis was a recurrent pain, on effort, behind the sternum, usually radiating across the chest, and sometimes in other directions. A great difficulty in assessing remedies was to provide an adequate control; this was done by prescribing a placebo for a period of two to four weeks, before any drug was tested, and repeating the control period later as often as was considered necessary. The patient kept notes of the number and severity of the attacks and of exciting factors, and allowance was made as far as possible for any variable factors in the environment. The following drugs were tested: sodium nitrite, mannitol hexanitrate, erythrol tetranitrate, potassium iodide, luminal, chloral, morphine, papaverine, phenacetin, diuretin, calcium diuretin, euphyllin, belladonna, digitalis, lacarnol, and harmol. In order to avoid suggestion the drug was prescribed in mixture form when possible. An analysis of the results shows that the placebo gave better results than most of the active drugs, and appeared statistically to be the better form of treatment. Even though there were two possible fallacies in this result—namely, an effect of suggestion, since the placebo was the first medicine to be given, and the fact that it was repeated more often than any single active drug so that it would be more likely to coincide with a natural remission—it seems clear that none of the active drugs could claim precedence over the placebo.

The results of this investigation, which if negative are none the less valuable, will not surprise many who see much of angina, and will confirm the belief that regulation of the mode of life is still the most important part of treatment. However, since drugs are often very effective in relieving the actual anginal attack, there seems no reason why further investigation should not lead to the discovery of some drug effective in the continuous treatment of this disabling malady; or possibly a remedy may be found along other lines, such as the metabolic or surgical, which are at present only in the early experimental stages.

GASTRIC SECRETION AND VITAMIN DEFICIENCY

How far gastric and intestinal secretion are under nervous control is still undecided: the undoubted response of digestion to nervous impulses may depend on regulation of tone and peristalsis more than on secretory changes. Some work now reported from the department of physiology at McGill University suggests that variations of secretion under nervous and other stimuli are influenced to a considerable extent by diet and especially by the presence or absence of vitamin B. In the early stages of their investigations, B. P. Babkin [1] and his colleagues found that splanchnic nerve stimulation (in cats) produced only a small mucoid gastric secretion which was alkaline in reaction; stimulation of the vagi, on the other hand, evoked a copious gastric secretion of high acidity, rich in pepsin and of great digestive power. The most interesting part of the work, however, lies in the changes which were found in the gastric juice when the animals were kept for a time on a vitamin-free diet. Thus a dog on a full diet was found to produce 56 c.cm. of gastric juice in thirty minutes after the injection of 0·75 mg. of histamine, whereas eight days after all vitamins had been removed from the diet the same injection only produced 4·6 c.cm. When a small quantity (10 g.) of powdered yeast was added to the diet the normal response was noted again after three days' feeding. The same failure of response of the gastric secretion when vitamin B was removed from the diet was noted when sham-feeding was carried out or 5 per cent. alcohol was introduced into the intestine. This change in secretory response with diet deficiency is suggestive in relation to the work of the last few years on pernicious anæmia.

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[5] New Eng. Jour. Med., 1933, ccix., 227.

[6] Quart. Jour. Med., July, 1933, p. 311.

[1] Canad. Med. Assoc. Jour., July, 1933, p. 5.

THE PHYSIOLOGY OF MICTURITION

"An outstanding problem in the physiology of micturition, and the key to full understanding of nervous disturbances of that function, is the determination of the means by which the bladder and sphincters, which possess a definite measure of autonomy, are subjugated to the control of the will." This is the problem that Dr. D. E. Denny-Brown and Dr. E. Graeme Robertson[1] have set out to solve, and their observations are unusually valuable because the subjects of their experiments were not laboratory animals but normal men. The fortitude and coöperation of these volunteers was essential to the investigation; for the data concerning the behaviour of the bladder and sphincters was obtained by means of urethral and ureteric catheters. These were passed one inside the other and each was connected to a delicate pressure-recording apparatus. Either could alternatively be connected to a reservoir for filling and emptying the bladder, whilst a record was being taken from the other, and their ends could be arranged in varying relationship proximal or distal to the internal and external sphincters. Simultaneous records were made of the movements of the rectum, perineum, and anterior abdominal wall; and whenever occasion arose the subject himself signalled his sensations and voluntary efforts on the record. As might be expected, analysis of the various pressure changes related to the signals provides instructive information.

According to Denny-Brown and Robertson the process of micturition begins with rhythmical contractions of the bladder wall; these may, however, be fused to give a smooth rise in intravesical pressure. The internal sphincter coincidentally relaxes, and this dual process is followed by release of the external sphincter. This latter act cannot be brought about by direct voluntary effort, nor by the supposed stimulus of fluid or pressure in the posterior urethra; it depends in some way upon the normally preceding contractions of the bladder and relaxation of the internal sphincter. Passive increase in the intravesical pressure, such as may be occasioned by strong contraction of the abdominal muscles, does not influence the sphincters at all. At the cessation of micturition, events proceed in the reverse order, but there seems no doubt that the *closure* of the external sphincter may be occasioned by a direct effort of the will. Following upon this, there is a dying away of the vesical contractions and intravesical pressure, with contraction of the internal sphincter. The last is not under pure pressure control, since it opens and closes at various pressures, but it always works reciprocally with the detrusor muscle.

The vesical contractions being the key to the process of micturition, interest centres around the nature and degree of their control by the will. Progressive intermittent filling of the bladder with fluid provokes reactions of contraction, which subside in the resting intervals; the general intravesical pressure rises gradually to about 10 cm. of water, until 500 to 600 c.cm. of fluid have been accommodated, after which it rises more steeply. The first conscious sensation is that of withholding imminent micturition. Excessive filling gives rise to strong waves of contraction, but these can be temporarily abolished by a voluntary determination not to micturate. If, on the other hand, during the period when sensation is yet absent, the subject makes an effort to micturate, waves of contraction quickly set in, and a great rise of intravesical pressure takes place; if at that point the subject decides not to micturate after all, the muscular activity of the bladder ceases and the pressure falls. It appears that the voluntary initiation of micturition involves a feeling of "letting go" on the part of the subject, and is more difficult than the more positive effort required to prevent micturition.

Denny-Brown and Robertson maintain, therefore, that the spontaneous reaction of the bladder wall to distension is one of contraction, and that normal micturition is entirely secondary to such activity. This activity is normally checked by a subconscious inhibitory process, whose point of action is the group of motor neurones concerned in the basic reflex. The building-up of this inhibition is synonymous with the acquirement of voluntary control, and also explains why the bladder can be "passively" distended. As the bladder fills, the inhibition rises into consciousness and becomes more or less of a voluntary effort. Micturition occurs when the inhibition is removed, and its removal is easier when it exists as a conscious sensation than when it is subconscious—i.e., when the bladder contains a relatively small volume. Voluntary contraction of the abdominal muscles, while it may increase the intravesical pressure, does not initiate micturition; the act must be thought about as a whole before bladder contractions supervene. An indication that the right kind of effort is being made seems to be the occurrence of a relaxation of the perineum, though this is not thought to have any direct influence in itself.

This conception of micturition is in line with the trend of ideas in modern neurology, in that due regard is paid to the influence on the reflex arc of concurrent inhibitions and facilitations. Thus the effect is pointed out of the previous treatment of the bladder, the abnormal posture of the subject, and his interest in the passage of events in the room. A different threshold for sensation is shown in the different subjects and in the same subject at different times, while discharge from the bladder is shown to be dependent not on the attainment of a critical pressure of its contents, but upon a balance of opposing factors which may vary from time to time. The theory will be tested when the investigators apply their technique to the purpose for which it is said to have been devised—namely, the examination of cases of nervous disorder. So far it appears to embrace most of the facts elicited, but the emergence of new phenomena in nearly every experiment suggests that further information may yet be forthcoming. The value of this, and the value of the method when applied as a test, may depend a good deal on the mental state of the patients.

DIETETIC TREATMENT OF OBESITY OF HYPOPITUITARY TYPE

The classification of obesity as either endogenous or exogenous has led to no little confusion, and it is only now being recognised that in almost every case the condition is due to both intrinsic and extrinsic causes, in various proportions. There is something to be learnt from the literal-minded surgeon who, when faced with a classical case of hypopituitary obesity, remarked: "Well, all this went in by the mouth." J. H. Kenyon,[1] who has been studying the dietetic factor in obesity, gives some interesting records of the effects of dieting upon 50 overweight patients who showed the typical distribution of fat commonly ascribed to hypopituitarism. They were given a high protein diet on the basis of 1 g. of protein per kg. of the computed optimal weight. This allowed three protein portions daily, two 5 per cent. vegetable portions, and four 10 per cent. fruit portions; skimmed milk was used for the calcium content, and extra vitamin A, B, and D added. In this way the diet was of high vitamin, protein, and mineral salt content, no sugar, butter, or bread being used. The bread substitutes were Heudebert bread sticks or breakfast biscuits, Charasse breads, Cellubran, and Cellubiscuits. It was found that the diet was in general satisfying and adequate, and that the difficulty at first lay in getting the patients to eat all that was prescribed. They were divided into three groups according to their weight: those in whom the obesity was least excessive were all reduced to their computed optimal weight, while the heaviest group (13 patients above 190 lb. in weight) showed an average loss of 1·9 lb. per week. Kenyon emphasises the finding that after the patients had been reduced to the optimal weight they could gradually return to an unrestricted diet without a corresponding increase in weight. Indeed no patient gained more than 5 lb., whilst 14 showed further loss, and 7 just held their weight. The return to the unrestricted diet was carried out slowly. In the first week unrestricted vegetables were allowed; beets, carrots, and peas, cooked without butter, were added. In the second week the addition of unlimited fruits, with the exception of banana, was made, and in the third week one slice of bread and one pat of butter daily. By the fifth or sixth week the patients could eat what they liked. Any acute illnesses, arthritis, gastric or duodenal ulcer, and nephritis, were regarded as contra-indications to the treatment; on the other hand, several cases with hypertension before treatment showed a return to a normal blood pressure when the obesity had been reduced. Whilst the evidence for regarding all these patients as examples of hypopituitarism is perhaps rather meagre (the distribution of the fat pads hardly being conclusive in the absence of other pituitary symptoms) there seems to be no doubt that Kenyon's treatment, under careful supervision, would be found of value in many cases of so-called hypopituitary obesity, where glandular therapy has proved ineffective.

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[1] Brain, 1933, lvi., 149.

MELANOSIS OCULI

Cases are occasionally seen in which the scleral or episcleral tissue of one eye (very rarely of both) displays abnormal patches of pigment approaching the cornea, but seldom extending quite up to it. A case is reported by Mr. Saradindu Sanyal[2] in which no other relative was known to have the same condition. The greater part of the visible sclera was pigmented a slaty-blue colour with patches of brown. The iris was also deeply pigmented, and there was excess of pigment in the fundus of the affected eye. Otherwise the eye was normal with good vision, but there was excess of pigment on the corresponding side of the face. More or less similar cases have been reported in European journals. In one described by the late Mr. George Coats[3] there were small elevations all over the surface of the iris, reminding him of the surface of a golf ball. The cases appear to be always congenital, but the amount of pigment has been observed to increase after birth. The only clinical significance of the condition is that in later life it may be associated with sarcoma, either extrabulbar or of the choroid. This was so in no less than 7 out of 26 cases collected by Coats; so the condition must be regarded with some anxiety.

HYPERTENSION AND PERSONALITY

Although patients with essential hypertension are sometimes stolid and care-free, it is often stated that most of them have a type of personality which is summed up by Moschowitz in saying that "they are terribly tense and pursue their vocation with tremendous seriousness, and worry over trivialities. In consequence they are irritable. They are the antithesis of the child. They do not play. They have no time for play. They have narrow intellectual horizons." The personality type of a group of hypertensives has been investigated by D. Ayman,[1] his clinical material consisting of 182 ambulatory patients. These were divided into three sets: the middle-aged with symptoms, the middle-aged without symptoms, and the young. There were 87 control subjects with normal blood pressure, subgrouped as middle-aged and young; they had few or no symptoms and in most cases had been referred for a general medical examination from the venereal or skin departments. From the replies to a series of questions put to both the hypertensives and the controls, it was found that from 40 per cent. to 90 per cent. of the former were, and had been as long as they could remember, unusually highly-strung, quick-tempered, sensitive, and worried over little things, being also more active physically than the average person of their own age. In the control group these traits were elicited in only 3 per cent. to 18 per cent. Hypertensive patients without symptoms gave a much lower number of positive answers to questions dealing with emotional responses such as quick temper and sensitiveness, but to the questions relating to physical activity, positive answers were about as frequent as from the other hypertensive patients. That the hypertensive personality and the tendency to high blood pressure is something inborn and recognisable at an early age is suggested by the lengthy duration of the characteristics to which patients admitted in the inquiry, and is further supported by finding these psychological traits in the group of young hypertensives, 80 per cent. of whom were known to have parents with high blood pressure. Ayman does not claim, of course, that the association he finds between primary high blood pressure and a special type of personality is invariable; he admits that either may occur without the other.

RELIEF OF PAIN IN TUBERCULOUS LARYNGITIS

Ulceration of the larynx is the most dreaded complication of the later stages of pulmonary tuberculosis, and its first symptoms are often accompanied by severe mental distress, for most consumptives are well aware that tuberculosis may attack the throat. Treatment by rest, in this case by silence, which is usually effective in incipient disease, may fail entirely to check its spread when tuberculosis has obtained a complete mastery of the system and death is only a matter of time. In such circumstances the relief of the pain which robs the patient of rest by day and of sleep by night, and which often prevents the swallowing even of liquids, becomes of paramount importance, and when the palliatives fail—such as cocaine, Anæsthesin, "upward swallowing," or the electrocautery—more active methods must be adopted. Of these, the alcoholic injection of the superior laryngeal nerve has been frequently tried, but the results have been on the whole disappointing. The injection itself may be painful and it often fails to bring any relief. In successful cases pain is only abolished for a limited period which varies from a few days to three or four weeks. The need for some more effective method is obvious, and a greater method of success is claimed by Forrester Raine and A. L. Banyai [1] for the method of "surgical blocking" of the superior laryngeal nerve. Under local anæsthesia the nerve is exposed where it crosses beneath the external and internal carotid arteries just above the point of origin of the superior thyroid artery; it is then injected with 95 per cent. alcohol, crushed and severed. Difficulties may be encountered when the nerve takes an aberrant course, and it is obvious that a skilful dissection is necessary to expose it, but Raine and Banyai failed to find the nerve in only one out of nine cases. In five cases a unilateral operation was undertaken and in three cases a bilateral block was performed, the two nerves being dealt with either simultaneously or successively. The operation was completely successful in four out of the eight cases in which the nerve was blocked, the patients experiencing complete relief from pain and regaining ability to swallow both liquids and solids without discomfort. The abolition of pain has a further advantage, for the adequate expectoration of septic material which would otherwise stagnate in the lungs is possible when laryngeal and pharyngeal movements are no longer prohibited by the pain of movement in the upper part of the respiratory tract. It is suggested that a similar operation might be employed for the relief of persons suffering from inoperable cancer of the larynx.

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[1] Jour. Amer. Med. Assoc., July 8th, p. 97.

[2] Calcutta Med. Jour., July, 1933, p. 1.

[3] Trans. Ophthalmol. Soc., 1912, xxxii., 165.

Amer. Jour. Med. Sci., August, 1933, p. 213.

PEPTIC ULCERATION AND EXTERNAL TRAUMA

THE claim has been advanced from time to time that external trauma may be the cause of a gastric or duodenal ulcer of the familiar type. J. Gerendasy [2] has lately reported the case of a woman, aged 44, previously free from digestive symptoms, who was awarded compensation in the New Jersey courts for a bus accident in 1930, in which she was thrown down, striking her epigastrium against the edge of a seat with sufficient force to cause bruising. Next day there was vague epigastric discomfort and the stools were black; 24 hours later she vomited blood; and a fortnight after the injury radiography revealed a niche on the lesser curve side of the first part of the duodenum. From the time of the injury she suffered from periodic attacks of pain and vomiting: two subsequent radiograms confirmed the original diagnosis of duodenal ulcer.

Since Potain in 1856 recorded a case of gastric ulcer with hour-glass contraction, alleged to have resulted from a blow in the epigastrium eight years before, a number of similar reports have been published; indeed, Petit in 1913 was able to collect 73. But certain conditions must be fulfilled if a case of this kind is to gain acceptance. Those laid down by Liniger and Motinens, as quoted by Gerendasy, are: proof of absence of ulceration before the accident; proof of trauma, severe and localised, to the epigastrium; immediate onset of symptoms; continuance of symptoms, and signs of ulcer. Gerendasy claims that his case fulfils these criteria. Several objections, however, at once present themselves. In the first place, it is a commonplace that absence of symptoms does not necessarily connote the absence of a peptic ulcer. Many cases run a symptomless course until the ulcer is discovered post mortem, or reveals itself by hæmorrhage or perforation—accidents that might well follow severe trauma. Symptoms may have been trivial, and disregarded by the patient until the injury drew his attention to them. Desire for compensation introduces a strong motive to forget or deny previous symptoms. In the present case a niche, indicative of a chronic ulcer, was found in the X ray two weeks after the accident, and in itself is evidence of the pre-existence of the ulcer. Secondly, in most of the published cases the diagnosis of ulcer has not been settled beyond a doubt. Thus in only seven of Petit's cases was the diagnosis established post mortem; in two of these death took place within five days, and the ulcers were of acute type, one produced by a bullet lying in the stomach, the other possibly due to sepsis. In eight cases operation was performed, in four of which an ulcer or scarring is stated to have been present. X ray examination was not done in any of the cases, and a test meal in only five: for most of them belong to last century. Gerendasy thinks that most of Petit's cases "seem capable of standing a strict scrutiny," but bearing these facts in mind, and noting how often the symptoms are atypical, few will be found to agree with him. H. Robertson, [3] for instance, in a comprehensive list of intra-abdominal lesions resulting from injury does not include this one.

STUDENT INTERCHANGES WITH POLAND

UNDER the auspices of the Medical Association of the University of Warsaw arrangements for holiday exchanges can be made between Polish medical students and those of other countries. The principle is that a foreign student is received in the Polish hospitals and clinics, board and lodging being provided, on the condition that similar facilities be given to a Polish student abroad. This year 69 foreign students have been received.

Warsaw has a population of about 1,200,000. There are 4 State hospitals with 276 beds, 14 public hospitals with 4894 beds, 12 hospitals belonging to philanthropic societies with 1048 beds, and 26 private hospitals with 510 beds—in all, 56 hospitals and 6728 beds. In addition to the hospitals there are many other matters of medical interest, notably the State school of hygiene and the municipal institute of hygiene. The reception given to students from this country is likely to be cordial. While many Polish doctors speak English, a working knowledge of French would be useful.

Intending students can obtain further information from the secretary of the Association addressed to the Kolo Medyków, University, Chalubinskiego 5, Warsaw. All arrangements should be made through the Polish Embassy.

WE regret to announce the death, on Sept. 4th, of Dr. John Playfair, president of the Royal College of Physicians of Edinburgh from 1904–06 and consulting physician to the Royal Hospital for Sick Children.

PATIENTS and staff have now been removed from Chorley old hospital *in Gillibrand-street to the new and more* rural building in Preston-road, Rookwood; the residence, in the grounds of which the new hospital has been built, has been converted into a nurses' home and administrative offices. The institution, which has been renamed the Chorley and District Hospital, and has cost £50,000, commands views of the Ribble estuary.

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[1] Amer. Rev. Tuberc., 1932, xxvi., 427.

[2] Amer. Jour. Surg., July, 1933, p. 12.

[3] Ibid., 1931, xiv., 395.

SPECIAL ARTICLES

FACTORS IN HUMAN FERTILITY AND THEIR STATISTICAL EVALUATION *

BY RAYMOND PEARL †
PROFESSOR OF BIOLOGY IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE

THE word "fertility" has long been used as a technical term by biologists and medical men, but too often without precise definition of the sense in which it was being used, or of the limitations of its meaning in a particular case. This is unfortunate because "fertility" has a number of meanings, of quite different biological connotations, as any dictionary makes clear. It is often used even in technical writing, for example, as identical and therefore interchangeable with "fecundity." But biologically fertility and fecundity denote two different things. To be sure in certain types of biological reproduction they come so close together as to be, for practical purposes, interchangeable concepts, but even there the fundamental distinction remains, philosophically speaking.

Because of this confusion in terminology, and in the thinking behind the verbalism, I attempted to define precisely "fertility" and "fecundity"[1] at the beginning of my work in this field nearly a quarter of a century ago (pp. 80–81), and have since adhered strictly to the usage then suggested. The pertinent passage is as follows:

> "In all viviparous, as compared with oviparous, animals, the study of these subjects (fecundity and fertility) is greatly complicated by the fact that the magnitude of the apparent or recorded productiveness is influenced by several separate and independently varying sets of factors. The unit of such statistics is the individual offspring at birth. But the production of an individual offspring by a viviparous animal implies (1) the removal of an ovum from the ovary (ovulation), (2) the *fertilisation* of this ovum, and (3) its successful *development* in utero. A considerable portion of partial or complete sterility in mammals is the result of a failure of the ovum to be fertilised, *this failure in no wise depending in many cases* on any fault of the ovum itself. The true innate fecundity of the female organism is clearly measured by capacity for ovulation. This is primary, and the other factors concerned in the production of an individual organism are secondary, in so far as the measurement of fecundity is concerned.
>
> "In view of these considerations it seems desirable to make use of a more precise terminology than that commonly employed in discussing these matters. We would suggest that the term 'fecundity' be used only to designate the innate potential reproductive capacity of the individual organism, as denoted by its ability to form and separate from the body mature germ cells. Fecundity in the female will depend upon the production of ova, and in the male upon the production of spermatozoa. In mammals it will obviously be very difficult, if not impossible, to get reliable data regarding pure fecundity. On the other hand we would suggest that the term 'fertility' be used to designate the total actual reproductive capacity of *pairs* of organisms, male and female, as expressed by their ability when mated together to produce (i.e., bring to birth) individual offspring. Fertility, according to this view, depends upon and includes fecundity, but also a number of other factors in addition. Clearly it is fertility *rather than fecundity which is measured in statistics of* birth of mammals."

If the above reasoning is sound, fertility, and not fecundity, is the variable measured in man by properly collected and standardised natality statistics. It is impossible practically to measure fecundity in man with any precision or generality.

Factors in Human Fertility

When the passage quoted above was written I was engaged in the intensive study of fecundity in the domestic fowl. In recent years a major research interest has been the study of human fertility, with special reference to the problems of population. In the reproductive physiology of man, five factors stand out as of prime importance in approaching a rational understanding and quantitative evaluation of human fertility. The overt manifestations of each of these factors are capable of quantitative expression and record, and the significance of each of them separately in the whole operation of human reproduction can be precisely or approximately measured by the use of appropriate statistical procedures applied to carefully collected data. To the collection of such data and their analysis a large part of the working time and energy of my laboratory is now being devoted. Lest there should be any misunderstanding on the point, it will perhaps be well to state categorically that we do not suppose that the factors listed below are the *only* ones importantly concerned in the determination of human fertility. We fully recognise that many other variables—social, economic, and other—play a rôle. But we do venture to assert that the variables here listed constitute an important part of the fundamental biological variables in human reproduction. Upon these biological variables social and economic forces may, and frequently do, act, and in so acting sometimes modify. But the biological variables are primary.

These biological factors in human reproduction, some of which involve psychological elements, to which we are devoting special attention are:

1. The rate of sexual intercourse per unit of time.
2. The rate of occurrence of pregnancy (in proportion to the exposure to risk of its occurrence).
3. The size of litter.
4. The reproductive wastage rate.
5. The live birth-rate.

In the above list the last item alone properly measures fertility in man. The first four items are measures of different major biological factors involved in the determination of fertility, but no one of them, nor any combination of them taken by themselves, measures fertility. The live birth-rate, when properly corrected or standardised for age and other differential demographic variables, is the only dependable and significant measure of human fertility yet available. It has long been recognised by statisticians that it was necessary to correct crude live birth-rates for the influence of these rates in different groups or populations, and in order to make a beginning towards any real understanding of their meaning. It is now seen that in order to get any deeper understanding it will be necessary also to analyse as far as possible the influence of such biological variables as those listed above. The correction of birth-rates for the influence of the standard demographic variables is only a first step. Progress in the direction of more penetrating analysis will doubtless be slow, partly because of the difficulty and expense of collecting suitable material. But a start is being made.

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* From the Department of Biology of the School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland, U.S.A.

† I am greatly indebted to my old friend Prof. Major Greenwood, F.R.S., for reading this paper in its formative stages. His criticism and suggestions have been very helpful and much appreciated.

Statistical Measurement of Human Fertility

Let us now consider briefly each of the five items in the list above, from two points of view: first, its bearing upon the broad problem of human fertility; and, second, the proper statistical method for its measurement.

FREQUENCY OF COITUS

1. The time-rate of coitus has an important influence in determining relative fertility in man. This fact is well known to gynæcologists and obstetricians who have had to deal with the sterility problem, but apparently not to sociologists (cf., for a recent example, Wolfe [2]). Many a case of long-standing apparent sterility has been promptly cured by stepping up the frequency of coitus from once a month to three or four times a week. But few quantitative studies have been made which make possible any appraisal of the correlation between the coitus-rate and the fertility-rate in a sample of any considerable size. Some years ago I published a small contribution [3] in this field, based upon material admittedly not random, but all that was available at the time. Since then I have been collecting more adequate data and hope to be able eventually to make a further report.

This coitus frequency factor in fertility may be satisfactorily and soundly measured for a group by a rate; of which the numerator will be the total number of acts of coitus experienced by the group in a stated time interval, and the denominator the total number of person-years involved in the experience over the same time interval as is involved in the numerator. In actual practice the basic data are obtained from individuals (in the best case their ad hoc diaries) and are stated as rates ab initio—i.e., as so many times per week, or per month, for the individual reporting. The subsequent assembling of these individual records into group statistics offers no particular difficulty.

PREGNANCY-RATE

2. The pregnancy-rate of a woman is a factor of major importance in determining the fertility of the mated pair of which she is one. Furthermore, it may not only theoretically (because of the biological processes involved) be different numerically from the realised fertility, but in actual fact often is quite widely different. The pregnancy-rate of a woman, in the age-period between puberty and menopause, is influenced by at least the following purely biological factors: (*a*) her coitus-rate, (*b*) her ovulation-rate, (*c*) the biological soundness of her ova, primarily indicated by their relative capability of being fertilised, (*d*) the biological soundness of her mate's spermatozoa, again primarily indicated by their ability to fertilise, (*e*) her reproductive wastage-rate (for reasons presently to appear). Besides these primarily biological or psychobiological factors in the case there is another, perhaps reasonably called psychological, of great importance—namely (*f*) the nature and extent of any contraceptive (birth control) techniques that may be practised by her, or by her mate, or by both of them as a conjoint enterprise.

The necessity for a separate analysis and quantitative appraisal of the pregnancy-rate as a factor in any general attack upon the problem of fertility seems clearly evident. It becomes especially important when one attempts to evaluate the importance of birth control as a factor in causing the decline in the birth-rate now occurring among so many populations. In planning and carrying on an extensive study of the latter problem,[4] I have been compelled to give careful consideration to the matter of pregnancy-rates.

It is a commonplace of the physiology of reproduction that normally after a mammalian ovum has been fertilised and implanted in the uterine wall a further impregnation cannot occur until after the uterus has been emptied of the product of the existing pregnancy. In short, a woman is not, and cannot be, exposed to risk of *becoming* pregnant *while she is already pregnant.* It therefore follows that any statistical measure of the time-rate of occurrence of pregnancy, if it is to attempt even the beginning of an approach to critical precision, should at the outstart make some sort of allowance for this plain physiological fact. Statistics of human reproduction come to the analyst, if sufficient trouble is taken in their collection, in the following form: a woman has been cohabiting during a specified length of time (generally from the date of her marriage to the date of record); in this interval of time she has experienced n pregnancies; of these pregnancies n_1 may have resulted in full-term living births, n_2 in stillbirths, n_3 in abortions or miscarriages ($n = n_1 + n_2 + n_3$). The duration of each of these several pregnancies may be determined and recorded to a close degree of exactness, if sufficient pains are taken, in a large proportion of cases. If through failure of memory or lack of coöperation on the part of the patients, the requisite data cannot be furnished, reasonable corrective terms based upon general statistical experience as to the distribution of pre-term terminations of pregnancy may be applied.

From these considerations we have used in our work up to the present time the following as a first approximation to a measure of the pregnancy-rate:

$$\text{Pregnancy-rate} = \frac{(\textit{Number of pregnancies experienced}) \times 10}{\textit{Person-years of exposure to risk of becoming pregnant.}}$$

When this rate is computed for the reproductive history of one particular woman the denominator of this fraction becomes "Years of exposure to risk of becoming pregnant." The manner of computing this is as follows [5] (pp. 532–533):

> "From the total number of years (and fraction of a year) between (from) the date of the woman's marriage and (to) the date of delivery from her last pregnancy [or the date of record when this is later than the date of termination of her last pregnancy but prior to the menopause, or to the date of the menopause when that is prior to the date of record] there is *subtracted* the amount of time spent in pregnancy. In case the exact time is not known the following average deductions are made:
>
> "0·750 year for each living child she has borne and delivered at term;
> 0·750 year for each still-born child she has borne and delivered at term;
> 0·250 year for each spontaneous miscarriage she has had;
> 0·375 year for each therapeutic abortion she has had;
> 0·250 year for each other abortion she has had.
>
> "These subtractions are made because of the physiological fact that a woman is not at the risk of *becoming* pregnant during the time that she is *already* pregnant. The amounts subtracted represent estimated average figures for the various events other than the first two, *and are to be used only when more precise individual records are not available regarding the actual duration of the pregnancy ending before full term.*"‡

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‡ To this statement should perhaps be added that the end of total exposure to risk of pregnancy cannot be taken in the midst of an existing pregnancy. This seems self-evident, but perhaps it is better stated categorically.

The pregnancy-rate, as above defined, has been fully discussed and illustrated in two recently published papers from this department.[4 5] In the form used in this laboratory it states the rate of occurrence of pregnancy per 10 person-years exposure to risk. In the calculation of these rates allowance should be, and is, made in the exposure to risk variable for prolonged absence of either partner from home, or long illnesses, or other known interruptions of the usual coitus-rate.

As we have gone further in the analysis of our complete collection of data it has become more and more apparent that the above described pregnancy-rate is not entirely satisfactory. It has both theoretical and practical difficulties. Being only a first approximation it does not go down near enough to the real biological roots of the matter. In the form stated it has no theoretical upper limit, and in actual practice may take extremely high values difficult of rational interpretation when calculated for individual women with peculiar reproductive histories. I have therefore devised another statistical measure of the pregnancy-rate, which I believe to be altogether more adequate.

In the statement above of the five variables concerned in the determination of a woman's pregnancy-rate, the second (*b*) "her ovulation-rate" is obviously the one of fundamental importance biologically. What we really want as a measure of pregnancy-rate is the answer, for each individual woman and constructively for the group, to the following question: What proportion of all the ovulations experienced during the period of observation resulted in the fertilisation of an ovum or ova and pregnancy? On the basis of our present knowledge of the physiology of reproduction it is possible to construct a measure of the pregnancy-rate which will answer the question to a degree of approximation sufficiently close to the actuality for all practical statistical purposes.

In proceeding to set up this new rate let us first consider certain underlying physiological matters.

(*a*) It is well established that normally the human female ovulates once, and once only, in each menstrual cycle.[6] While it may be the fact, though it has not yet been conclusively demonstrated, that some women may occasionally menstruate but not ovulate, as has been shown to be the case in monkeys by Corner [7] and Hartman,[8] this must be so rare an occurrence if it occurs at all that it may be neglected in statistical practice. Any effect of so neglecting it would be to make the stated pregnancy-rate slightly lower than its true value.

(*b*) From (*a*) it follows that the number of ovulations in a year will normally be determined by the average length of the menstrual cycle. This is usually stated to be 28 days, and there is a great deal of accumulated evidence that, statistically speaking, this is extremely close to the average figure. For example, Kelly [9] found 942 out of 1000 women reporting a 28-day interval. Heyn [10] reported the same interval for 63·5 per cent. of 1684 women. Sanes [11] found 75 per cent. menstruating regularly and 72 per cent. of these at 28-day intervals. Recently Allen [12] and King [13] have emphasised the variability of the interval, but upon calculating the biometric constants for King's own data for 354 menstrual intervals, derived from two groups of women ranging from 17 to 35 years, we find the following results:—

Mean interval = 28·41 ± ·17 days
Median interval = 27·94 ± ·21 days
Standard deviation = 4·83 ± ·12 days
Coefficient of variation = 17·0 ± ·4 per cent.

Plainly with a probable error of mean and median of the order of four to five hours on the basis of a sample of only 354 intervals no serious error will be made by taking 28 days as the average length of the menstrual cycle for statistical purposes. This gives 13·04 ovulations per woman per year. Considering the approximate nature of the calculation, in that all individual variation in respect of the menstrual interval is going to be neglected, no harm will be done by dropping the decimals and taking 13 as the normal average number of ovulations per year.

(*c*) A woman normally does not ovulate during the time she is pregnant, nor during the puerperium (the period between parturition and the complete involution of the uterus).

We may then set up the pregnancy-rate as follows:

Let M = the total period (in years) during which a woman engages in copulation, between puberty and the menopause (for practical purposes the duration of marriage within the same limits—that is, between puberty and the menopause); and

P_1 = duration of time (in years) she spends in the pregnant state, and regardless of the manner of its termination (by term birth, or abortion, &c.); and

T = number of times she becomes pregnant during the time-period M; and

P_2 = duration of time (in years) she spends in the puerperal state (taken to a rough approximation as $\cdot 04\,T$ or $\cdot 04\,(T-1)$ when, as is the case in our records, the period of observation and record ends with the date of termination of a pregnancy).

Then $M-P_1-P_2$ = duration (in years) of exposure to risk of pregnancy, and $\frac{100\,T}{13\,(M-P_1-P_2)+T}=R_p$ = pregnancy-rate per 100 ovulations.

This pregnancy-rate may take any value between the limits zero and 100. For the completely sterile mating ($T=0$) it will be $R_p=0$. The more fertile the woman the higher will be the rate. That some women may closely approach the upper limit of 100 per cent. performance over considerable periods of time is shown by the following example from our records:—

This woman had been married 5·5 years, and in that period had been pregnant 17 times. Two of these pregnancies terminated in live births at term; 15 of them ended in self-induced abortions. Assuming, as a rough approximation, that each of these abortions occurred at the completion of two months of pregnancy, we then have the following values:—

$M=5{\cdot}5$ yrs.; $P_1=4{\cdot}83$ yrs.; $P_2=0{\cdot}64$ yr.; $(M-P_1-P_2)=0{\cdot}03$ yr.

Then $R_p=\frac{1700}{17{\cdot}39}=97{\cdot}8$ pregnancies per 100 ovulations.

This woman, in short, during the first five and a half years of her married life became pregnant just under 98 per cent. of the times she ovulated.

The pregnancy-rate may, if it is thought desirable, be weighted for age, to allow for the fact, as an example, that three pregnancies occurring in a woman between 40 and 45 years of her age would be regarded as a relatively better reproductive performance than three pregnancies between 20 and 25 years. But the statistical magnitude of the material we are studying is such that we propose to analyse it in separate quinquennial age-periods for each woman and in the mass, and consequently I have not felt it necessary or desirable to add any age-weighting factors to the rate equation.

Applying this rate to the reproductive performance of a group of 1348 married white women living in wedlock, whom I have recently studied,[4] the following results are obtained regarding the effectiveness of contraceptive methods *as practised* in the group.

In short, in this sample of women, in one less ovulation per 100 occurring (in round figures) was an ovum fertilised with resulting pregnancy in the C+ group than in the C—

group. The standard error of this difference is 0·17, so that we may say that while absolutely small it is over five times its standard error, and that therefore birth control as actually used by these C+ women was associated with a really lower pregnancy-rate.

—	C+ (Some form of contraception used).	C− (No attempt at contraception).
Number of women ..	493	855
Ovulations $(M-P_1-P_2)+T$	28,939	39,442
Pregnancies (T)	1,376	2,294
Pregnancy-rate (R_p) ..	4·8 per cent.	5·8 per cent.

It is interesting to note that, taking the whole sample together, slightly more than 1 ovum in every 20 ovulated, *during the reproductive lives of these women up to the* time of observation, had been fertilised with resulting pregnancy.

SIZE OF LITTER

3. The modal litter size in human reproduction is one. But litters of 2, 3, 4, and occasionally higher numbers do occur, in point of fact, and in sufficient numbers to make the total number of children produced by a group of women sensibly different from the total number of full-term pregnancies experienced by the same group. Furthermore it is entirely within the bounds of possibility that the mean litter size for the human species, or for particular groups, races, or varieties of it, may show a secular change. Animal breeders have been able to observe, and have a hand in bringing about, just such secular changes in the mean litter size of races or strains in other species. An example is afforded by the experiments of the late Alexander Graham Bell in breeding sheep at Beinn Breagh, Nova Scotia.[14] In any case the desirability of studying critically the question of litter size in connexion with any thorough investigation of fertility seems apparent.

This factor in human fertility may be dealt with quantitatively in either of two ways: (1) by taking some function of a ratio such as

$$\frac{\text{Number of developing or developed individuals (fœtus or child) produced}}{\text{Number of pregnancies}};$$

or (2) by forming a frequency distribution of observed litter sizes (including in it, of course, the products of all pregnancies whatever the stage of development of the product may be) and treating this distribution by customary biometric methods. Both of these methods will have their points of usefulness.

WASTAGE

4. "Reproductive wastage" in human breeding may be defined as the sum total of failures of pregnancy to result in the birth of living offspring at term. Such failures may be due to a variety of causes. They will include stillbirths, spontaneous abortions and miscarriages, abortions induced for therapeutic reasons, and abortions induced for "criminal" reasons. While each of these items may be considered separately, and desirably so by the medical statistician, the student of population will perhaps usually find his primary interest in the totality of reproductive wastage. It has an important relation to fertility. Reproductive wastage tends to increase, *both in the group and in the individual*, with an increase in fertility, but in one group of women, at least, it is not sensibly correlated with economic status, as measured by family income per week.[5]

Reproductive wastage is satisfactorily measured by a rate, of the following form:

$$\text{Reproductive wastage rate} = \frac{(\text{No. of failures of pregnancy to yield full-term live births}) \times 100}{\text{Total number of pregnancies.}}$$

This rate gives the percentage of all pregnancies which result in failure.

It may be noted that another measure of reproductive wastage might be taken as the numerical difference between the pregnancy-rate (R_p) and the birth-rate (R_b) if both of these rates are calculated on the same base—namely, number of ovulations (see infra).

LIVE BIRTH-RATE

5. As has already been implied, the live birth-rate is the only significant and valid measure of *fertility*, properly defined, in man. It states the net biological *accomplishment* of reproductive activity, and represents the integrated effect of the several factors separately considered above, plus the effects of various other, probably generally less important, factors not here considered. When derived from population statistics the birth-rate takes the form of a mean instantaneous rate over a relatively short period of time, usually in practice a period of one year. Naturally such rates should be, and wherever possible are, made as specific as possible relative to the usually recorded variables of age, colour or race, &c. The methodological procedure in this type of birth-rate is that one starts with mass data (total births over total defined population at risk in the same short time interval) and gets in the final rate a mean value for the group or population, without at any stage in the process having known anything about any particular individual's reproductive activity. All that is known is that *some* individuals in the group at risk had each one baby (neglecting for simplicity in the argument twins and other litter sizes) during the short period covered by the observations.

In the more detailed biological analysis of fertility the birth-rate may be profitably developed along a different line of reasoning, in which the procedure starts with the separate computation of each individual woman's birth-rate, over a specified time interval and at a specifically described age. The separate individual rates so computed may then be combined into a mean rate for the group by the application of standard biometrical procedures. This would seem to be the method of preference whenever the necessary data are at hand, which, however, is not usually the case when the student must depend solely upon official statistics. Both procedures should, when applied to large groups, give averages differing inappreciably one from another, but the latter gives more information along the way.

In our work on fertility in this laboratory we have, up to the present, chiefly employed this second method of computing birth-rates as a measure of fertility. We find a convenient form of the rate to be:

$$\text{Live birth-rate} = \frac{(\text{Number of live births}) \times 10}{\text{Person-years married (or cohabiting)}}$$

with, of course, due regard for making the rates specific for reasonably narrow age ranges. This figure gives the fertility-rate of the woman (or, by proper statistical combination, of the group) per 10 person-years exposure. In the calculation of such rates, just as in the pregnancy-rate, allowance should be made for prolonged absence of either partner from home, or long illnesses, or other known interruptions of the normal coitus-rate.

As an alternative to the above the birth-rate may be calculated on the basis of ovulations experienced, as was done for the pregnancy-rate. On this basis we have—

$$R_3 = \frac{100\,L}{13\,(M - P_1 - P_2) \div T}$$

where L denotes total number of live births, and the other letters have the same significance as before. This form of the live birth-rate has the advantage that its biological relationship to the pregnancy-rate is at once apparent. It gives the number of live births per hundred ovulations during the period of observation.

Summary

In this paper the attempt has been made: (1) to give a rational definition of the terms "fertility" and "fecundity"; (2) to describe and discuss certain distinguishable biological factors in human fertility; and (3) to suggest and illustrate statistical methods by the use of which each of these factors may be quantitatively evaluated.

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MEDICINE AND THE LAW

Verdict of Murder against Mental Patient

We discussed last week the rider attached by a coroner's jury to a verdict of murder against a patient in the Macclesfield mental hospital who had killed an attendant with a porcelain utensil. The patient will not have to stand his trial at the Chester assizes to which he stood committed. The Home Office has directed his removal to Brixton prison with a view to his transfer to Broadmoor on being certified unfit to plead. To some it may have seemed a perverse verdict to find a man guilty of wilful murder whose mental condition was such as to justify this intervention by the Home Office. Had the case gone for trial to the assizes, he would in all probability have been found either unfit to plead or else insane at the time of committing the act which caused death; a verdict of murder would have been extremely unlikely at the assizes. When magistrates examine allegations of crime, they generally refrain from committing an accused person for trial if there is no reasonable prospect of a conviction. Why then, it may be asked, should a coroner's jury brand as a murderer a mental patient who will either not be put upon his trial at all or, if tried, will be found innocent of criminal intent? The explanation is that it is not deemed to be within the province of a coroner and his jury to inquire into the mental state of any person except in the case of alleged suicide. Where there is no element of suicide, the coroner's court must presume ordinary mental capacity. If the facts would justify a verdict of murder or manslaughter in the case of a person of sound mind, such a verdict should be returned even though doubts may exist as to the accused's mental competence. It is pointed out in "Jervis on Coroners" that this principle specially applies where an inmate of a mental hospital has killed another inmate or a member of the hospital staff. Otherwise the public does not obtain the protection of the coroner's warrant which in a proper case ensures the arrest of the person concerned and his detention in the appropriate institution.

Osteopath Fined under the Medical Act

Last week the Plymouth magistrates convicted an osteopath of the offence of unlawfully using the titles of physician and surgeon. Section 40 of the Medical Act authorises the infliction of a fine of £20 upon anyone who wilfully and falsely pretends to be a physician or doctor of medicine or takes or uses any name, title, addition, or description implying that he is registered under the Act or that he is recognised by law as a physician or surgeon. The evidence indicated that Mr. Emanuel Mitchell, the osteopath against whom the proceedings were taken, had on his brass plate the title "D.O.," understood to mean doctor of osteopathy. He was entered in the telephone directory as "Dr. Emanuel F. Mitchell, osteopath." On his stationery he described himself as "Osteopathic Surgeon," adding the initials "D.C., D.O., and N.D." (understood to mean doctor of chiropractic, doctor of osteopathy, and nature doctor), and as medical adviser to the Plymouth Workers' Health Council and lecturer to another body. On May 9th he wrote a letter to a west country evening newspaper in which he discussed such matters as are usually dealt with by a duly qualified practitioner. There was of course not the slightest objection to his publishing views on such subjects, but in signing the letter he used the description "osteopathic physician and surgeon." Mr. Mitchell was charged with four offences: (*a*) using a title implying that he was registered by law as a practitioner in medicine; (*b*) using the title of "surgeon"; (*c*) using the title of "physician"; and (*d*) using a title implying that he was registered under the Medical Act. The magistrates convicted him under (*b*) and (*c*), apparently because of his signature to the letter in the press, and acquitted him under (*a*) and (*d*). Mr. Mitchell, who conducted his own defence, called witnesses who said that they had benefited by his treatment and had not been in any way deceived by him as to his qualifications; they knew, they said, that he was an unorthodox or drugless practitioner. He told the Bench that the General Medical Council could have no monopoly in the title of "surgeon" since there were plastic surgeons, dental surgeons, and veterinary surgeons. If, however, Mr. Mitchell were to describe himself as a dental surgeon or veterinary surgeon without the necessary qualifications, he might find himself in the same difficulty. There would be more sympathy with the unregistered practitioners against whom prosecutions of this kind are undertaken were it not that they seem to want the best of both worlds. The titles and descriptions adopted are often those which will confuse the minds of the public by suggesting that the practitioner is duly qualified. This confusion is the abuse which the Medical Act, as its preamble shows, was enacted to remove. In fining Mr. Mitchell £20, the magistrates declined to make any order as to costs. They were impressed perhaps by his statement that the medical council was a rich body with assets of £70,000.

It was, of course, the Medical Defence Union which was prosecuting, at its own expense.

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

DIPHTHERIA IN NEW YORK STATE

ENGLISH readers are already familiar with the results of New York City's successful campaign for the immunisation of its children against diphtheria. Less spectacular but hardly less effective has been the steady pressure for immunisation work exerted by the State department of health in "upstate" New York. Their records show that more than a million children, outside of New York City, have received either three inoculations of toxin-antitoxin or two inoculations of toxoid. One-quarter of these children were under 5 years of age at the time of immunisation. The effect of this steady progress is shown in the following Table:—

Diphtheria, New York State Exclusive of New York City

Year.	Cases.	Deaths	Deaths of children under 5 years.
1926	3647	250	123
1927	3914	263	141
1928	2898	221	113
1929	2256	193	98
1930	1594	144	76
1931	1256	95	43
1932	654	59	22

Experience has shown the great importance of immunising the children under 5 years of age. It has also shown that to secure this end special methods must be adopted. The help of school authorities and of the newspapers and the ordinary methods of publicity are relatively ineffective for this particular purpose. House-to-house canvassing by public health nurses has been found to be very productive. Particularly with mothers who do not understand English this method gives access to the younger children, and an opportunity to allay maternal fears due to misunderstanding of the procedure. Of the children immunised last year 44 per cent. were less than 5 years old. What is happening in New York is happening to a greater or less degree throughout the country. The statistics of the Metropolitan Life Insurance Society for the first half of 1933 show that the diphtheria death-rate has dropped over 45 per cent. from the previous minimum recorded last year. It is probable that the introduction of alum toxoid, now obtainable commercially, will speed the process of immunisation in the remoter rural communities.

PSYCHIATRY IN THE MEDICAL SCHOOLS

At the instance of the National Committee for Mental Hygiene Drs. F. G. Ebaugh and R. A. Noble undertook two years ago a study of the teaching of psychiatry in the medical schools of Canada and the United States. Their report has now been published. It covers the curricula of 68 medical schools, of which 20 had independent psychiatric departments, 15 combined psychiatric and neurological departments, while the remainder gave psychiatric instruction in the department of internal medicine, excepting a single school that made no provision for such instruction in its curriculum. Four schools spent practically one-half of the amount appropriated annually by the 68 schools for the teaching of psychiatry. The investigators consider that these four schools only spend an adequate amount of money in teaching this subject. They do not, however, consider that every medical student should be trained as a psychiatrist, but on the contrary consider that most of a psychiatrist's training must follow his qualification as a physician. To this end they would see established graduate instruction in university centres, the granting of advanced degrees and diplomas in psychiatry, and the establishment of a qualifying board for specialists in this subject.

LOSS OF THE PUBLIC HEALTH SUBSIDY

Twenty-eight States that were receiving federal subsidy last June for the maintenance of rural public health work are still without any immediate hope that this subsidy will be renewed. In a message to the western branch of the American Public Health Association, Dr. C. E. Waller, assistant surgeon-general, says: "It is the hope of the service that the withdrawal of its support may be for a temporary period only, and that the local units may be able to bridge the gap." The State of Washington has joined the small group of States which at present appoint a health commissioner on a non-political basis; at the governor's request the surgeon-general has assigned from his staff Dr. E. R. Coffey to occupy that position. Dr. Coffey is a native of Kansas City, Mo., and graduated from the Kansas University Medical School in 1923.

BUDAPEST

(FROM OUR OWN CORRESPONDENT)

MARRIAGE, BIRTHS, DEATHS, AND DISEASE IN BUDAPEST

THE latest report shows that the marriage-rate in Budapest is now 10·5 per 1000, compared with 10·2 20 years ago. The age of marriage, however, has risen. In the last two decades the percentage of women marrying between the ages of 20–25 has fallen from 35·5 to 31, and there is also a decrease between the ages of 25–30 years; whereas the number of women marrying between the ages of 30–40 years has risen from 1786 to 2534, between 40–50 years from 456 to 674, and of women of 50 years of age or over from 185 to 272. The birth-rate has fallen from 25·6 per 1000 inhabitants (23,327 births) 20 years ago to 16·3 per 1000 inhabitants (16,341 births). In 1912 every fifth child born was illegitimate, to-day the rate is one in six. The birth-rate per 1000 has fallen among Roman Catholics from 28·6, 20 years ago, to 18·1; among Protestants from 30·1 to 20·3; among Jews from 19·1 to 8·6.

The mortality-rate has fallen during the last 20 years from 18·5 per 1000 inhabitants to 16·5. Part of this improvement may be explained by the fall of the birth-rate which has reduced the infant mortality from 4708 to 2747. The number of deaths of persons over 60 years of age has increased from 3724 to 5867, and this is reflected in an analysis of the causes of death. The diseases to which children and young people are more susceptible are causing fewer deaths. Pulmonary tuberculosis was still responsible for a large number of deaths (2051, as against 2891 in 1912), but the figures for intestinal catarrh (340 as against 1031) and scarlet fever (58 as against 434) show substantial reductions. On the other hand, the figures for the diseases of middle and old age show an increase; the number of fatalities due to cancer (1415 as against 966), organic heart diseases (2109 as against 1255), and arterio-sclerosis (1218 as against 612) has risen. There were fewer fatal accidents (354 as against 464) and fewer homicides (45 as against 78), but though there is a decrease in the number of male suicides the increase in the number of female suicides has caused an increase in the total number (547 as against 430).

Since 1912 the public health staff of Budapest has risen from 2998 to 4288, the number of physicians from 1522 to 3469, the number of available hospital beds from 4785 to 7655, and the number of patients treated from 136,785 to 229,256. This development of the hospital services has had the effect of masking the improvement in the mortality-rate of the town itself. The number of inhabitants who died in hospital last year was 12,897 as against 14,170 in 1912, but an increasing number of people, usually already very ill, come to the hospitals from the surrounding districts, and of these 3663 died last year as against 2706 in 1912.

IRELAND

(FROM OUR OWN CORRESPONDENT)

A SCHEME FOR MEDICAL RESEARCH

DURING the past ten years several schemes for the establishment of an institute for medical research have been put forward, initiation in each case springing from the Royal Academy of Medicine in Ireland. Attempts were made more than once to interest the Rockefeller Foundation, but they failed. More recently the promoters have addressed themselves to those in charge of the Irish Hospitals Sweepstakes, and they have had a sympathetic reception. Under the last Act dealing with the sweepstakes power was given to devote funds to the purpose of research. The 45 hospitals interested have expressed themselves as willing that their several shares should be diminished by such amounts as would render the establishment of a research institute possible, and the Hospitals Committee has appointed a sub-committee to act with a committee of the Royal Academy of Medicine in Ireland in the preparation of a scheme and its submission to the Minister for Local Government and Public Health. A feature of the scheme as now put forward is that it should be "international" in character. By this is meant, it is understood, that grants should be available for workers outside Ireland as well as in the country, the scheme, however, being controlled by an authority to be set up in Ireland. The capital sum required to make such a scheme effective is estimated variously from £300,000 to £1,000,000.

THE APPOINTMENTS COMMISSION

The work of the local appointments commission has undergone a radical change of procedure which is warmly welcomed by the medical profession. When the commission was established some five or six years ago the procedure adopted was to select one candidate for each appointment and "recommend" him for election to the local authority concerned. The "recommendation" was mandatory, and the local authority had no option but to appoint the person recommended. Eighteen months ago, after the change of government, the personnel of the commission was altered, and a new procedure was adopted. Instead of recommending one candidate the commission now sent down the names of three, arranged in alphabetical order, from whom the local authority could make its choice. The change was welcomed by many members of local authorities who thereby had some of their ancient patronage restored. But this restoration of patronage tended in many cases to appointment being made on other grounds than those of efficiency or suitability. It commonly happened that one of the three on the list had some local influence, and if so he was invariably appointed, regardless of his relative suitability. It is clear that the appointments commission has now recognised that its change of procedure was a mistake and was leading to the appointment of relatively inferior officers, for it has reverted to the old practice of sending down only one name. This decision has elicited loud protests from some members of local authorities whose sense of importance is injured. There is no doubt that it will, however, lead to a better choice of officers. The Act under which the commission functions gives power to make the selection, if the commission thinks fit, by means of competitive examination, and many members of the medical profession would welcome such a change, if only because it would be a step in the direction of the establishment of a State medical service.

HEALTH OF COUNTY DUBLIN

The first annual report of Dr. J. A. Harbison, medical officer of health for County Dublin, deserves serious study. He points out that the infant mortality-rate for the county is considerably above the average for the Irish Free State and above that prevailing in similar areas in other countries. The housing conditions are unsatisfactory. During the year 605 dwellings were condemned as unfit for human habitation. In the borough of Dun Laoghaire there are 185 insanitary houses of slum type which should be pulled down. Dr. Harbison draws attention to the rapid increase of wooden dwellings, mainly along the coast, for use as summer residences. These huts do not appear to be governed by any sanitary by-laws or regulations. In some areas fields are densely packed with these dwellings. Dr. Harbison noted that there were in general in the areas in which these huts were situated defective drainage of the land, imperfect water-supply, and no adequate disposal of household refuse. The structures were in all stages of disrepair and dilapidation, and in the main, as regards sleeping accommodation, inadequate in respect of light, ventilation, and cubic space. The dry closets were usually inadequate in number, primitive in construction, often in unsuitable positions, usually with exposure of excreta to flies, and some inaccessible in hot weather. Dr. Harbison gives interesting information as to the milk-supply, infant welfare work, and the medical inspection of school-children.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

THE PERSONNEL OF THE SCOTTISH ADMINISTRATION

Sir Godfrey Collins has appointed Mr. John Jeffrey to be permanent under-secretary of State for Scotland, from Oct. 1st, in succession to Sir John Lamb. Mr. Jeffrey is at present secretary to the Department of Health for Scotland, and his transfer involves an important administrative principle—namely, that the chief officer of the secretary of State for Scotland shall have had direct experience of Scottish administration. In this respect Mr. Jeffrey has an exceptional record. Among his later appointments he served as secretary of the National Health Insurance Commission for Scotland. When, in 1919, the Local Government Board and the Insurance Commission were amalgamated as the Board of Health, he became joint secretary and, later, sole secretary. When this board, in turn, was superseded by the Health Department he became head of the department. Sir John Lamb, who now retires, also had special advantages in his experience before entering the Scottish office, and those that have come in contact with him through his 12 eventful years as under-secretary have nothing but praise for his judgment and sense of direction in public affairs. In making such appointments the Minister, by custom, usually transfers a head from another department, and the tendency has been to recognise no difference between the experience in a Scottish and in an English department. But the recent discussions of Scottish national administration have emphasised the importance of living experience in Scotland. It is understood that, in the case of the Scottish office, the new under-secretary of State will divide his time between London and Edinburgh. Mr. Jeffrey's post in Edinburgh is filled by Mr. J. E. Highton, whose experience has been mainly acquired under the National Health Insurance Acts. He has done much work for the adult education movement, and is chairman of executive of the Scottish Council for Community Service in Unemployment.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdrs. R. J. Inman to *Pembroke* for R.N.B., Chatham; M. B. Macleod to *Malaya;* W. P. Vicary to *Frobisher;* and S. R. Johnston to *President,* for R.N. Medical School, Greenwich.

Surg. Lt.-Comdr. (D.) R. R. Adams placed on the retd. list with rank of Surg. Comdr. (D.).

Surg. Lts.: H. J. McCann to *Pembroke* for R.N.B., Chatham, and to *Calcutta* for trials; C. H. N. Joyn, to *President* for post-graduate course; A. Lawrence-Smith to *Norfolk;* and P. N. Walker-Taylor to *Weston.*

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Comdr. A. G. L. Reade to *Rodney.*

Surg. Lts. H. A. Lockhart to *Renown;* and R. J. Carr (proby.) to *Rodney.*

ARMY MEDICAL SERVICES

Lt.-Col. A. N. Fraser, from R.A.M.C., to be Col.

ROYAL ARMY MEDICAL CORPS

Maj. A. N. R. McNeill to be Lt.-Col.

RESERVE OF OFFICERS

The undermentioned, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.: Lt.-Col. J. C. G. Carmichael.

Lt.-Col. R. Phillips, having attained the age limit, retires and retains his rank, with permission to wear the prescribed uniform.

Capt. J. V. Morris, from Active List, to be Capt.

TERRITORIAL ARMY

Capt. G. L. Malcolm Smith to be Lt.-Col. and to comd. 11th (2nd Scottish) Gen. Hosp.

W. Patrick to be Lt.

ROYAL AIR FORCE

Squadron Leader C. P. Barber to Central Medical Establishment for duty as Medical Officer, vice Squadron Leader C. T. O'Neill.

INDIAN MEDICAL SERVICE

Lt.-Col. A. H. Proctor to be Col.

Maj. N. M. Mehta to be Lt.-Col.

Capt. (on prob.) W. Aitchison to be Maj. (on prob.).

The prob. appts. of the undermentioned officers are confirmed: To be Capts.: R. W. H. Miller (now Maj.), W. Aitchison (now Maj.), Lt. J. H. Crawford, and G. R. M. Apsey. To be Lts.: D. McD. Fraser (now Capt.), J. D. Grant, W. H. G. Reed, T. E. Palmer, W. J. Poole, and C. J. H. Brink.

The undermentioned appts. are made: To be Capt. (on prob.): N. J. U. Mather. To be Lt. (on prob.): J. G. Stonham.

Capt. J. Acheson retires on account of ill-health.

PROBLEMS OF MEDICAL PRACTICE IN AMERICA

(BY A SPECIAL CORRESPONDENT)

I

THE report of the Committee on the Costs of Medical Care, which was noticed in THE LANCET of Jan. 7th, 1933, and the more recently published summary[1] of the investigations undertaken by the committee, though based almost exclusively on data collected in the United States, raise questions which are of importance to the medical profession in all countries; and both volumes may profitably be studied by medical practitioners in whatever field of practice they are engaged. The central problem attacked by the committee was described some years ago by Dr. Olin West, secretary of the American Medical Association, as "the great outstanding problem before the medical profession to-day"; and he defined it as that of "providing adequate scientific medical care to all people, rich and poor, at a cost which can reasonably be met by them in their respective stations in life." The problem, which has become intensified by the economic depression, has since the war roused much public interest in America with the growing realisation that large and increasing sections of the community are unable to pay for the medical care they need. Advances in medical science have made treatment more complex as well as more efficient. In many cases the best results require the services not of one practitioner only, but of a team of practitioners, and team-work though effective is expensive. As the chairman of the committee puts it in his foreword to the summary of investigations:—

> "Medical care of a kind and amount which the knowledge of the times dictates, has been carried further and further out of reach of millions of families. . . . Increasingly, for many people the choice is to live with disease or suffer with debts."

The question gave rise to so much discussion that at a conference of representative doctors, health officers, and social workers held in Washington in May, 1927 (during the annual meeting of the American Medical Association), the nucleus of the Committee on the Costs of Medical Care was formed; and after some nine months' preliminary consideration it was decided to undertake a five years' programme of research. The committee as fully constituted consisted of 50 members, all persons of distinction in their various vocations. There were 16 private medical and 2 dental practitioners, and 6 public health officers, besides representatives of medical, dental, nursing, and pharmaceutical organisations, universities, hospitals, and the general public. The chairman was Dr. Ray Lyman Wilbur, Secretary of the Interior in President Hoover's administration and now president of Stanford University, and the vice-chairman, Dr. C.-E. A. Winslow, professor of public health in the Yale University. For its five years' research the committee employed a staff of 14 highly trained investigators with numerous assistants; and the results of their inquiries are embodied in 26 reports and 15 miscellaneous contributions, which are condensed in the summary volume mentioned above. Further investigations were also made by organisations collaborating with the committee, including the American Medical Association, and the outcome of this five years' mass investigation is a body of information on medical care which is without precedent in its scope and fullness of detail.

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[1] The Costs of Medical Care: A Summary of Investigations on the Economic Aspects of the Prevention and Care of Illness. By I. S. Falk, Ph.D., C. Rufus Rorem, Ph.D., C.P.A., and Martha D. Ring. With a Foreword by Ray Lyman Wilbur, M.D., Chairman of the Committee. The University of Chicago Press. 1933. Pp. 650. $4.

FACILITIES FOR MEDICAL CARE

The committee find that the provision of medical care in some form or other is one of the larger industries in the United States: nearly 1,100,000 persons derive their livelihood from it. There are 142,000 qualified medical practitioners, of whom 121,000 are engaged in private practice, 62,000 dentists, 47,000 midwives, 443,800 nurses, 132,000 pharmacists, and 196,000 lay personnel in hospitals, clinics, and public health agencies. There are 7000 hospitals with a total capacity of nearly 1,000,000 beds. In addition to these facilities for medical care, there are 7700 osteopaths, 16,000 chiropractors, 2500 naturopaths, and 10,000 religious healers.

The facilities are, however, distributed not according to needs, but to ability to pay for service. Consequently there are not enough practitioners and hospitals in many communities, while in others there are more than the community requires. In South Carolina there is one doctor to every 1430 persons; in California, one to every 571 persons. The number of dentists per 100,000 population is 19 in Mississippi and 101 in Oregon. Of the 3072 counties in the United States only 1765 have hospitals for general community use.

In 1929 the people of the United States spent 3656 million dollars on all forms of medical service, excluding the cost of hospital treatment of communicable diseases. This sum, which is equivalent approximately to $30 per head of the population, was about 4 per cent. of the money income of the country. It is interesting to note that in the same year the expenditure for tobacco, toilet articles, and recreation was 5807 million dollars, and for automobiles and other means of transit 9475 million dollars. The committee think that the total expenditure on medical care is not excessive, but that much of it is wasted: no less than 125 million dollars were spent on "cultists"—osteopaths, chiropractors, naturopaths, and faith healers—and 360 million dollars on patent medicines. Of the total amount spent on the different forms of medical care, 29 per cent. was received by private medical practitioners, 23 per cent. by hospitals, 12 per cent. by dentists, and 5 per cent. by nurses.

SERVICE NEEDED AND RECEIVED

The committee found that although the incidence of illness per family or individual did not vary substantially with income, there was a wide variation in medical services received. The persons in the lower income groups received far less of nearly every kind of service than the persons in the groups with higher incomes. This was not because the latter received more attendance than they needed; for on the standards of adequate medical care formulated by the committee it appears that even in the highest income group for nearly all services "including even prenatal and postnatal calls to maternity patients and immunisations and health examinations, the wealthy families received less service than these reasonable standards required." In the lowest income group—persons with incomes under $1200 (£240)—the committee find that each year nearly one-half of the individuals "receive no professional medical or dental attention of any kind, curative or preventive." As regards dental care only, there is a wider discrepancy between the services needed and the services received. Among families with incomes not exceeding $2000 (£400), which constitute one-half of the total population, the average amount spent on dental care annually is *only* $9 (36*s.*) per family; and the committee estimate that not more than 21 per cent. of the population receive any form of dental care during an average year.

The main reason why the costs of medical care have caused so much dissatisfaction in America is that they fall very unevenly among families in each income group. The committee's investigations show that while the annual charges for medical care amount on average to $108 (£21 12*s.*) per family, 58 per cent. of the families have average charges of $24 (£4 16*s.*), and 4 per cent. have average charges of $804 (£160 16*s.*). When the income groups are considered separately similar variations are found in each. And not only are costs unevenly distributed; they cannot be foreseen; no one can predict the onset of illness, or its severity or the cost it will entail; hence the planning of a family budget, which is encouraged in America and has been facilitated by the instalment system of payments, cannot be applied, except by wealthy families, to sickness costs. "On the present fee-for-service basis," say the committee, "it is impossible for 99 per cent. of the families to set aside any reasonable sum of money with positive assurance that the sum will purchase all needed medical care."

REMUNERATION OF PRACTITIONERS

The committee find that the medical costs that are too high for many families are not reflected in large incomes for medical practitioners, and they are quite definite that no solution of the problem can be reached through a reduction in the average of professional incomes. In 1929—the "boom" year in America—one-third of all private medical practitioners had *net* incomes of less than $2500 (£500). Practice expenses are high, amounting on the average to about 40 per cent. of the gross income. This is partly because it is now exceptional for an American doctor, general practitioner or specialist, to see patients in his own house. He takes an "office" in the business centre of the town, where rents are high, and there he is consulted by patients who may live only a few doors from his private house. Professional incomes vary much more widely in medicine than in several comparable professions, especially between general practitioners and specialists. In 1929 the average net income of the former was under $4000 (£800); that of the latter over $10,000 (£2000). This may partly explain the increase of specialism in America. The committee state that 45 per cent. of the medical practitioners completely or partially limit their practice to a specialty, whereas in the view of the committee the needs of the community would be met if not more than 18 per cent. were specialists. The growth of specialism has been favoured by the increased urbanisation and mobility of the population. Many persons do not trouble to select a family doctor, but when taken ill apply to the specialist who seems to them most suitable for the case. As the American home is becoming more and more an apartment in a block of flats, hospital treatment is increasing in popularity in cases of serious illness and in maternity cases, and hospital treatment in America is expensive.

FEE-SPLITTING

The wide difference between the fees of general practitioners and of specialists is partly responsible for what is known as fee-splitting. As to the extent to which this practice, which is strongly condemned by the medical profession, exists, the committee's researches afford little information; it is not a subject that lends itself to precise statistical statement. But they remark that it is well known that "some medical cases are prolonged needlessly, some unnecessary operations are performed, and some necessary operations are performed by surgeons who are selected because of the size of the rebate which they will secretly give to the referring family practitioner."

No summary could convey an adequate idea of the scope and thoroughness of the committee's survey of the difficulties inherent in the present position. It has led them to the following general conclusion :—

> "As a profession medicine has gone forward with strides during the last century and especially during the last 25 years. Its progress in understanding the human body and in perfecting techniques and instruments is almost unique in the history of civilisation. . . . Even in the last decade, medicine's advance in the unending warfare against sickness is little short of miraculous. . . .
>
> "As an economic activity, however, medicine has made much less phenomenal progress. The predominant economic institution in medical practice to-day—private individual practice—dates back to ancient times. Under this system medical services are now so provided that many persons either cannot or do not receive the care they need, or are heavily burdened by its costs. At the same time, many of the practitioners and the agencies which provide medical service are inadequately occupied and poorly remunerated. A barrier—in large part economic—stands between practitioners able and eager to serve, and patients who need the service but are unwilling or unable to pay for it."

The measures taken by the public and the profession to meet these difficulties, and the judgments and recommendations of the committee upon them remain to be considered.

PANEL AND CONTRACT PRACTICE

The Capitation Fee Again

As the result of information received from panel committees all over the country the Insurance Acts Committee came to the conclusion during the past year that there was sufficient evidence of an all-round increase in the insurance practitioner's work to warrant a request being made for an increase in the capitation fee. This has not been revised since it was fixed at 9*s.* in 1924, when it was expected that it would be open to revision after a short period. Two years ago a deduction of 10 per cent. was accepted by insurance practitioners as their contribution to the national economy, and—as the I.A.C. informed the Minister of Health at an interview on July 14th—in some areas, for example the North-East coast and South Wales, insurance practitioners are experiencing quite serious hardship. The I.A.C. asked the Minister whether he had any evidence of discontent in the service resulting in inefficiency, and if he would give his opinion as to the appropriate time for pressing the claim for an increase in the capitation fee. In reply Sir Hilton Young said he had made inquiry through the regional medical officers and believed that such dissatisfaction as existed was due to the 10 per cent. cut rather than to the basic rate of the capitation fee. There was, he added, no evidence at all of falling off in the efficiency of the service. His view was that the present would not be an appropriate time to put forward any claim for increase. If nevertheless a claim for arbitration was put forward the result would be this (we quote his words from the Supplement to the *British Medical Journal*, August 19th, p. 129) :—

> "In the first place, it was obvious that counter-arguments could be submitted, and might prevail. The result of arbitration might therefore be a lowering and not a raising of the capitation fee. If, however, the result was an increase in the capitation fee, then the question must at once arise whether the financial position did not necessitate some measure of reduction in the service provided. There was no source from which new money could be found. An Exchequer grant could certainly not be contemplated."

The subject has by now been reported no doubt to most panel committees by their representatives. In doing so to the Cheshire committee Dr. H. W. Pooler asked three questions :—

1. Is the discontent more than normal, and if so is it mainly due to the capitation rate or to the cut or to both, and which is the more important factor ?
2. If the Ministry offered arbitration would the Cheshire practitioners be willing to go to arbitration with the possibility of the capitation fee being lowered. Is the case for revision so strong as to put that possibility out of court ?
3. If the Ministry refused would they decline service ?

Dr. Pooler himself thought the insurance medical service was doing 2*s.* 8*d.* more work a head than when the 9*s.* capitation fee was fixed. The cost of living had however fallen and the fee should therefore be now about 10*s.* 4½*d.* The chairman of the Cheshire committee who criticised the pessimistic character of the I.A.C. report said :

> "Our work is harder and fuller than it used to be. We have more people in our surgeries. The character of the work is more exacting. Diagnostic and therapeutic methods are expanding. In view of all this I do not like the attitude of diffidence. We want to hear more of the combative spirit which proceeds from the reflection that we are not being fairly treated. . . . I do not like these official statistics about the cost of living—doctrinaire statements. We have the feeling that to run the practice is much more costly than it used to be, we are underpaid and harder worked."

He answered Dr. Pooler's questions by affirming that there should both be a restoration of the cut and an upward revision of the fee commensurate with or at least in acknowledgment of the increased work. "Our case," he concluded, "should be stated in small compass and should go up at once to the Minister."

The views here set out seem to be held in private by many insurance practitioners who do not express them to their representatives on local medical or panel committees, where they could be handed on to the I.A.C. It is disquieting how little interest the profession as a whole takes in the work of its representatives on such committees. This lack of organised opinion has a depressing effect on those engaged in fighting points as and when they arise on behalf of the whole profession. The Insurance Acts Committee itself has no quick means of knowing what the views of the profession are on any particular matter, and often a decision has to be arrived at rapidly. It has been suggested that insurance practitioners would probably appreciate the work done on their behalf by the central committees if they had to pay for it. That is not borne out in London where there is a statutory levy on the pool to pay the expenses of the panel committee (not the personal expenses of its members), including the salaries of clerical staff, a full-time medical secretary, and an organising medical secretary, and the members of the service are as apathetic as elsewhere to what is done for them. Post-card replies are invited to the three questions Dr. Pooler asked the Cheshire committee. It will be interesting to see what is the response.

CORRESPONDENCE

THE RECOGNITION OF POLIOMYELITIS

To the Editor of THE LANCET

SIR,—In view of the occurrence of an epidemic of anterior poliomyelitis in the autumn of 1929 and then again in 1932, and of a few cases this year, it seems possible that we are in danger of an epidemic during the next two months. Epidemics usually occur at the end of hot, dry weather, and are consequently usual in the autumn. In the autumn of 1929 over one hundred cases in South-West Lancashire and North Wales came under my care, a few days, a few weeks, or a few months after the onset. In 1932, during a smaller epidemic, about 40 cases were treated in my clinics. It is interesting that there was a tendency to get the cases in 1932 earlier than those in 1929. This year I have already seen ten cases within a few days of onset of paralysis. During May and June there was a small epidemic in the area of St. Helens, Skelmersdale, and Widnes, and this unusually early occurrence of acute cases may have been due to the hot, dry weather which occurred in this area in the early part of the year. In the last week of August I saw four cases—one from Liverpool with a history of only four days (complete paralysis of the left arm).

In the three epidemics mentioned we have carefully considered the question of serum as a means of preventing paralysis. I am convinced that in a great number of cases diagnosis would be quite impossible early, even if the case were under expert observation. There would still remain, however, a certain proportion in which the diagnosis would have been possible had not the doctor, duly called in, failed to think of infantile paralysis. There is often great excuse for this failure because of the prevalence of measles or some other infection at the same time. In my opinion the greatest assistance towards making the diagnosis would be the knowledge that there is, or may be, an epidemic. If this knowledge were made available to practitioners and, more important still, to the public, there would be a much greater likelihood of getting a case before paralysis occurs. The value of serum treatment may still be unproven, but it behoves everyone responsible for the treatment of children to be prepared at least to admit early cases to nursing-homes or hospitals, and to do a lumbar puncture before paralysis has supervened. My experience tends to indicate that a lumbar puncture alone may abort the infection. Even if it is not possible to prevent the paralysis, it is still possible to cut it down to the very smallest extent by early, efficient treatment.

I am, Sir, yours faithfully,

Liverpool, Sept. 2nd, 1933. BRYAN MCFARLAND.

THE SURGERY OF THE BLADDER NECK

To the Editor of THE LANCET

SIR,—An editorial article in your issue of July 29th is based upon the discussion held at the recent International Congress of Urology on the surgery of the bladder neck. I am a little disturbed at what you allege to be my position in the matter, since I am at a loss to know where such information could have been obtained. You say, "Prof. Hugh Cabot went so far as to state that the day had almost arrived when only exceptional cases of prostatic obstruction would be treated by enucleation." No such statement appears anywhere in the contribution which I read at the Congress, and I feel quite confident that I have never expressed any such opinion, since I do not believe it to be true. I was concerned in this discussion with presenting what had actually occurred at the Mayo Clinic in the last five years, and presented the material in statistical form as a review of the last 1200 cases, divided equally into two groups, those treated by suprapubic prostatectomy and those treated by transurethral resection. The nearest approach which I made to expressing an opinion was in the last paragraph of my paper in regard to functional results, which read as follows :—

> "Finally I call attention, though it is perhaps unnecessary, to the fact that it is probably unwise to undertake to draw final conclusions in regard to the completely satisfactory character of the final results of the transurethral method. It is true that we have some cases treated by the transurethral method more than ten years ago, all of which as far as we have been able to determine are in satisfactory condition. We have more than 100 cases of more than three years' duration in which the results have apparently been satisfactory. Of course permanently satisfactory results are by no means always obtained by suprapubic prostatectomy, and a small though important group fail of complete relief because of remaining mechanical obstruction. However, it is not suggested that at this time the question of the permanency of the result can be satisfactorily answered from our experience."

This would appear to indicate that I agreed with your statement that the time for passing a final judgment on the scope of perurethral methods in the treatment of enlarged prostate has not yet come. I am, however, a little surprised at your view that we need statistical data rather than vague generalities. It was precisely for this reason that I presented a paper that was in fact almost wholly statistical, and which appeared to me to place at the disposal of the profession a group of carefully studied facts which should aid in the formation of an opinion.

I have on other occasions frequently taken pains to point out that conclusions which are quite valid from the experience of a single hospital or clinic in one part of the world may be difficult or impossible to reconcile with the experience of another region. I have tried to make clear my opinion that difference of environment, nationality, and similar important variables make it unwise to attempt to lift bodily the experience of one region and assume it to be applicable to another. I continue, however, to believe that the sort of evidence which I presented to the International Congress of Urology is of considerable importance in leading to a conclusion.

I am, Sir, yours faithfully,

HUGH CABOT.

Mayo Clinic, Rochester, Minnesota, August 23rd, 1933.

A SEQUEL TO SCARLET FEVER

To the Editor of THE LANCET

SIR,—May I draw the attention of your readers to a serious type of case following scarlet fever that differs clinically from any that I have previously seen since I have been otologist to the fever hospitals of London. Eight patients have come under my care since Easter, six are dead, the life of one hangs in the balance, one only has recovered.

The usual story is as follows, during or after the scarlet fever an otitis media develops. Immediately or some time later one is led to suspect disease of the mastoid bone either from the presence of swelling in that region or from tenderness over the bone, or, by the process of exclusion, because of a temperature that is unexplained by any other lesion that can be discovered. The persistence of this temperature leads one to operate upon the mastoid bone; a fully developed mastoiditis may be discovered, or it may seem that some osteitis is present but not to a degree to account for the symptoms, or no disease may be recognisable by the naked eye in the bone from which the hæmolytic streptococcus may be grown. After the operation the patient does well except that the temperature remains up. The wounds may pour with pus, but except for this they show no signs of reaction; there is no sign of healing, the bone remains uncovered by granulations, and a stitch inserted cuts straight through the skin. The temperature remains high and may rise to 105° F. and then the end comes quickly with the onset of meningitis after one to four weeks.

A hæmolytic streptococcus may or may not be cultivated from the blood; but I think it right to classify all as cases of septicæmia. It would seem that the invasive power of the organism is increased. There is no suspicion of influenza or other acute infection of the upper respiratory tract having supervened to cause this. The tongue remains remarkably clean until the end. In no case has direct extension to the lateral sinus been found to account for the invasion, which may occur without involvement of the mastoid region, for in one case there was no suspicion of any inflammation of the middle-ear cleft, and invasion had apparently taken place through the mucous membrane of the nasopharynx from which profuse bleeding had occurred. It is not certain that operation is advisable, for in another case in which but little was seen in the bone a subsequent rapid local extension involving the brain occurred in the terminal stage after the end of a week. Nor has the operation appeared to have had any beneficial effect upon the disease. In the case that recovered I was by no means certain at the time of operation that any disease of the mastoid was present. No investigation was made of the bone from this case, but the hæmolytic streptococcus was cultivated from the blood. In the two cases where disease of the mastoid has been undoubted the operation has done nothing to stay the course of the disease which has continued unchanged as though no operation had been done. Albuminuria has occurred in three cases and in one a dilated heart that gave signs of failing at one stage of the operation.

I have no specific treatment to suggest. Vast quantities of fluid with fruit juice and glucose seem to be the best. I demand that as much as 200 ounces should be got into a child of 12 within the 24 hours; but I think it necessary that they take solid food as well. The child that recovered would not take well; but the sister-in-charge gave a coffee enema three or four times daily and found that for a short time after each the child's opposition disappeared and she could then get in the food and drink.

The importance of these cases to those working outside fever hospitals lies in the fact that in one of them the ear disease did not occur until five days after the child had returned home. The attack had been a mild one without any complications and with no suspicion of ear disease. It would be interesting to learn whether others have seen one or more cases of this type recently. If any have done so we must I think be prepared to meet an increased number during the coming winter and carefully to consider what we should do in any case, particularly whether we should refrain from operation on the mastoid.

I am, Sir, yours faithfully,

T. B. LAYTON,

Otologist to the Fever Hospitals of London.

Sept. 1st, 1933.

PUBLIC HEALTH SERVICES

Poverty and Medical Aid

IT is unfortunately necessary to fix certain standards of income for the provision of free medical help. The work of the committees who fix the scales is not a simple task, for they have to consider on the one hand the views of those who attach importance to the maintenance of parental responsibility and think that benefits given free without discrimination are apt to be treated lightly; and on the other the views of those who feel that the prevention of ill-health and lasting disabilities in the community are so important as to outweigh all other considerations. The scales in use in different parts of the country are in fact not quite the same, as may be seen from a study of recent reports by medical officers of health. The care committees and others who have to apply the scales when fixed, do so as a rule with sympathetic discrimination.

Scale No. 1

A = Number in family (including parents).
B = Weekly income per head of family (rent deducted).

A	B		A	B	
	s.	*d.*		*s.*	*d.*
1	13	0	4	7	6
2	10	6	5	7	0
3	8	6	6 and over	6	6

At Pontypridd, the centre of a depressed area, two scales of income for determining necessity were adopted by the council and approved by the Ministry of Health in 1930. The scale applied by the health department in connexion with applications for (*a*) supply of milk to mothers and children, (*b*) provision of free spectacles, (*c*) payment of midwives' fees, is given above.

Another scale is applied in connexion with applications for (*a*) dentures for nursing and expectant mothers, (*b*) orthopædic treatment, (*c*) hospital provision for maternity cases.

Scale No. 2

C = Number in family (including parents).
D = Total family income (less rent for four weeks).

C	D		C	D	
	£	*s.*		£	*s.*
2	5	0	8	15	0
3	7	4	9	16	4
4	9	4	10	17	0
5	11	0	11	17	12
6	12	12	12	18	0
7	14	0			

If the family income (plus the amount received in maternity benefit in the case of hospital treatment for maternity cases) is below the scale the council bears the whole cost; if the income is above the scale, patients are required to contribute the sum which is in excess of the standard income for the four weeks. In the case of hospital treatment for puerperal fever or puerperal pyrexia under the council's scheme, the financial circumstances of applicants are individually considered by the council in determining the contribution payable in accordance with the recommendation of the Ministry of Health.

In Dover last year no free milk was supplied officially. Cases so necessitous as to need free milk were helped by a voluntary committee of ladies. The scale of income under the local scheme was :

Scale.	Weekly income per head of family after rent deducted.	Cost per quart to authority.	Applicants pay per quart.
A	Under 5*s.*	6*d.*	2*d.**
B	5*s.* to 6*s.*	5*d.*	3*d.**

* or more, according to retail price.

For dried milk under scale A the local authority pays 1*s.* and the applicant 6*d.*; under scale B, 6*d.* and 1*s.* respectively. Owing to the economic conditions amongst the families supplied through the welfare centre, and the increasing number of applicants, the authority increased the allocation to this scheme for the financial year 1932–33 from £225 to £475, and after careful consideration the scale of income was amended as under, a free section being added to the scheme :

Scale.	Weekly income per head after deduction of rent.	Cost per quart to authority. S.	Cost per quart to authority. W.	Applicants pay per quart.
A	3*s.* 6*d.* and under	8*d.*	9*d.*	Nil.
B	3*s.* 7*d.* to 5*s.*	6*d.*	7*d.*	2*d.*
C	5*s.* 1*d.* to 6*s.*	5*d.*	6*d.*	3*d.*

S. = summer ; W. = winter.

For treatment at the school clinics a fee of 6*d.* a week is charged for minor ailments or dental cases ; for tonsil and adenoid operations 2*s.* 6*d.* to 15*s.* 6*d.* according to weekly income over 5*s.* Fees for orthopædic cases are carefully graded thus :

Out-patient Section

Weekly income per head.	Treatment per week.	Appliances.	Railway fares.
(*a*) 5*s.* or under	Free	Free	Free
(*b*) 5*s.* to 7*s.* 6*d.*	6*d.*	¼ cost	„
(*c*) 7*s.* 6*d.* to 12*s.* 6*d.*	6*d.*	½ cost	Ch.
(*d*) 12*s.* 6*d.* to 15*s.*	1*s.*	Full cost	„
(*e*) Over 15*s.*	1*s.* 6*d.*		

In-patient Section

Weekly income per head.	Treatment per week.	Appliances.	Railway fares.
(*a*) 5*s.* or under	Free	Free	Free
(*b*) 5*s.* to 7*s.* 6*d.*	2*s.* 6*d.*	¼ cost	„
(*c*) 7*s.* 6*d.* to 12*s.* 6*d.*	5*s.*	½ cost	Ch.
(*d*) 12*s.* 6*d.* to 15*s.*	10*s.*	Full cost	„
(*e*) Over 15*s.*	20*s.*		
(*f*) £250 per annum or over, full hospital and other charges.			

Ch. = charged.

At Hendon Dr. A. F. Adamson reports that any child suspected to be suffering from subnutrition is given milk and cod-liver oil emulsion free of charge where the net weekly income per head, after deducting rent and rates, does not exceed 10*s.* for a family of two, 9*s.* for three, 8*s.* for four, 7*s.* for five, 6*s.* 6*d.* for six, 6*s.* for seven and over. Family here includes the parents or guardians (or older sisters looking after home and not working) and children under 14 years of age. At Greenwich Dr. E. G. Annis pleads that the provision of milk is a preventive of ill-health and not merely a means of subsistence. He cites budgets to show "what some heroines in ordinary life are able to do," and the account of how Mrs. C lays out her money to feed two adults and six children on an income of £1 7*s.* 3*d.* from the labour exchange and £1 from school cleaning must be read to be believed. Sometimes the amount of the sum charged to the parent may have a marked influence on the proportion of cases treated, which is one of the essential criteria of successful organisation. Dr. Adamson, of Hendon, writes :—

> "During the year under review the fee for dental treatment was revised. Under the old system 2*s.* was paid for each child, which enabled that child to have dental treatment during the period of one year from the date of the first appointment, the fee being sent to the clinic before treatment was commenced. Bearing in mind that the acceptance figures in some schools in the district was not good, this system had certain disadvantages . . . . the parents hesitated to send 2*s.* or more for dental treatment of which they did not realise the importance, unless it was purely for the relief of pain. Under the new system 1*s.* is paid for a year's treatment, and if the fee is not brought to the clinic at the first appointment this does not prohibit treatment being commenced."

The new system has improved the acceptance figure and has made the working of the dental scheme much easier. Similar consequences are reported elsewhere.

Dr. A. Greenwood, of Kent, reports that it was found necessary to assist the parents of 156 children with travelling expenses in connexion with medical treatment, and 331 pairs of spectacles were supplied without charge. Regarding the treatment of eye conditions, Dr. C. Franks, of Co. Durham, remarks that the prevention of blindness and defective vision represents the conversion of a contingent liability into a definite asset not only for the patient but for the community. The influence of economic difficulty is noted by Dr. G. L. Brocklehurst in the words : "Contributions by parents are made for treatment when their means can afford it, although more parents were unable to make any contributions than in the previous year owing to the general depression and unemployment."

In the Kentish Hopfields

We are in the midst of the hop-picking season ; business is good ; the weather is perfect for outdoor life ; and so far there has been little report of illness among the pickers. A tour by Dr. A. C. Parsons, medical officer of the Ministry of Health, with Dr. S. N. Galbraith, medical officer of health for South-West Kent, a combined health area which includes 61 per cent. of the hopfields, showed that for the most part the hoppers' camps were satisfactory in cleanliness and equipment, the increased prosperity no doubt making growers more willing to coöperate with local authorities in improving the conditions. The numbers concerned are large, for this year at least 60,000 pickers are employed on the 386 hop farms where the accommodation averages five pickers to a hut. The arrangements are vastly improved since some years ago the county and local authorities combined with the Southern Railway, the Farmers' Union, and a number of voluntary organisations to form a committee for supervising the health of the hop-pickers, on which the Ministry of Agriculture and the Ministry of Health were represented. Since 1924 the hospital at Marden, ten miles from Maidstone, has been open during the hopping season, owing to the admirable initiative of Mr. and Mrs. J. A. Spender, and last year some 800 cases were dealt with at this hospital and the medical huts attached to it ; in other parts of the hopping district various missions maintain medical centres and dispensaries with the help of nurses and medical students ; but, as a writer in the *Nursing Times* has remarked, the rank and file of the hoppers' army "is not composed of hygienically-minded girl guides and boy scouts," and the period is an anxious one for the Kentish authorities.

The question whether infectious disease occurring among the hoppers is the responsibility of the local authorities alone or a matter for the London County Council has been under discussion for many years past. It has recently been stated semi-officially that the Ministry of Health regards it as the duty of the Kent county council to look after sick London pickers and to bear the cost. Dr. Galbraith, in presenting a case for acceptance of responsibility by the London health authorities, points out that :—

> (1) Hop-picking is an exceptional occurrence, being a mass migration of about 60,000 from London to Kent for at most a month each year, not comparable with the movements of ordinary holiday population. At the seaside towns an average expected increase of the population from three to six months in the year can be provided for. The hotels are assessed but the hoppers' huts are not.
>
> (2) The Kent councils do not dispute the general principle that they are responsible for dealing with cases of infectious disease which occur in their area. One bed per 1000 of the census population is provided as the standard for average requirements. This statutory provision is made for the London population, of which the hop-pickers form part, and is readily available by ambulance for the pickers whether in London or in Kent. It seems unreasonable to expect the rural councils to duplicate the accommodation in Kent for the probable needs of only three to four weeks each year.
>
> (3) In the majority of cases the disease is contracted in London and brought down to the country. The pickers prefer when ill to be treated in their own London hospitals, and do not wish to leave their children behind in rural hospitals. So strong is this feeling that illnesses are concealed, and persons travelling in trains and buses are exposed to grave risk of infection by pickers travelling back to London whilst suffering from infectious disease.

Dr. Galbraith adds that the London boroughs from which most of the pickers come support his proposal. In South-West Kent there are 5 fever hospitals totalling 148 beds and 2 small-pox hospitals with 64 beds which have hitherto been enough to deal with ordinary and hop-picker cases, but in the event of an epidemic the position might become serious and still more inequitable. In 1931 the Kent county council passed a resolution offering to send London hopper patients by ambulance under proper supervision to a central station in London, where the L.C.C. might make arrangements for their disposal, but the offer was refused. Dr. Galbraith recalls the principle of transfer of cases recognised in the public assistance service. If a destitute London hop-picker falls ill from a non-infectious disease and is admitted to a Kent institution the cost of treatment becomes chargeable to the L.C.C., or alternatively he is transferred to an L.C.C. hospital. It is this principle he wishes the L.C.C. to agree to in cases of infectious disease occurring amongst London hop-pickers.

It seems that in 1929 the Lewisham and Hampstead borough councils informed the L.C.C. that they were prepared to support the Tonbridge and Maidstone rural district councils in asking the London public health authorities to accept responsibility for all cases of infectious disease occurring amongst persons from London who go to the district for hop-picking, and to arrange for their removal back to London, on the ground that the migration of such persons is in all respects incomparable with the ordinary movements of holiday population. The public health committee of the L.C.C., however, advised the council that the principle always followed by public health authorities in this country, and certainly in London, was that cases of infectious disease occurring in a district were the responsibility of the local sanitary authority, and the L.C.C. approved the principle. The Ministry of Health had then already ruled that the Metropolitan Asylums Board could not be held legally responsible in such a case either for the provision of hospital treatment or for the payment of the cost of such treatment. The Board itself recognised that infectious disease among the hoppers might occasionally overtax local resources, and offered to receive, so far as they were able, suitable cases on the understanding that the Kentish authorities would pay their whole cost. In July, 1931, when the L.C.C. became responsible for hospital provision for infectious diseases in London, the Kent county council was informed that the L.C.C. could not depart from the position adopted in 1929, but would be willing to assist in the same way as the M.A.B. had done. In response to a request from South-West Kent, the L.C.C. last June prepared a leaflet containing information and advice designed to lessen the risks of the spread of infectious disease among hop-pickers.

> HOP PICKING
>
> Help is asked of all those who will go hopping this year to lessen the risks of spreading infectious disease among London hop-pickers.
>
> 1. *You can help by preventing actual cases of infectious disease, or contacts of cases of infectious disease, from entering the hopfields.*
>
> It is unlawful for anyone suffering from an infectious disease to travel in a public conveyance, the penalty being a fine not exceeding £10. Apart from this there is great danger of spreading disease to other families in the hopfields.
>
> Anyone who has been in contact with infectious disease is strongly urged not to go hopping during the three weeks following contact. People who have been in contact with infectious disease and who go to the hopfields against advice are sent back by the farmers.
>
> 2. *You can help by preventing cases of tuberculosis from entering the hopfields.*
>
> No one suffering from consumption or tuberculosis should go hopping as there is a grave risk to other people sleeping in the huts, which are always overcrowded at week-ends.
>
> 3. *You can help by making sure that only pickers booked by the growers go to the farms.*
>
> No one should go hopping who has not actually been engaged by the farmers to pick, as the accommodation is limited.
>
> Overcrowding will cause great discomfort in the huts, the sanitary provision will not be adequate, and the risk of an outbreak of infectious disease will be increased.

This leaflet has been distributed widely by borough councils, relieving officers, and the school organisation in London. A notice was also inserted in the L.C.C. Gazette asking all officers of the council who come into contact with families who go hop-picking to give advice when opportunity offered.

The Drought

The Ministry of Health states that the present shortage in domestic water-supplies is so far not so serious as in the droughts of the summers of 1921 and 1929. The most important periods of the year for water-supply are spring and early summer, and the rainfall at that time was generally plentiful. On the whole there is no present shortage in the large gathering grounds which supply the big towns or in those areas which rely on underground sources reached by deep wells. Where the serious shortage exists is in some rural areas, which have to rely on shallow wells and small surface supplies—for example, some parts of Lincolnshire and North Wales. The drought is nevertheless sufficiently serious to need immediate attention on the part of all responsible local authorities, and the Ministry has therefore issued a memorandum to the authorities confronted by serious shortage, making suggestions by way of first-aid for the conservation of supplies—for example, by careful attention to all leakages, and the use, when available, of non-potable water for other than domestic purposes—and indicating precautions against danger to public health, including chlorination when the purity of the water is threatened. The authorities are urgently cautioned about this last matter, and they are also asked to warn the public to exercise strict economy in their consumption of water for domestic and garden purposes. The engineering inspectors of the Ministry, who in the course of their duties visit most parts of the country, are ready to advise on the spot as to the steps to be taken.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 26TH, 1933

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 8 (last week 9); scarlet fever, 1829; diphtheria, 732; enteric fever, 45; acute pneumonia (primary or influenzal), 413; puerperal fever, 35; puerperal pyrexia, 108; cerebro-spinal fever, 22; acute poliomyelitis, 27; acute polio-encephalitis, 6; encephalitis lethargica, 5; continued fever, 1 (Wrexham R.D.); dysentery, 10; ophthalmia neonatorum, 3. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on August 29th–30th was as follows: Small-pox, 20 under treatment, 0 under observation (last week 24 and 1 respectively); scarlet fever, 1586; diphtheria, 1458; enteric fever, 11; measles, 514; whooping-cough, 305; puerperal fever, 21 mothers (plus 10 babies); encephalitis lethargica, 254; poliomyelitis, 1; "other diseases," 162. At St. Margaret's Hospital there were 20 babies plus 8 mothers with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 9 (3) from measles, 1 (0) from scarlet fever, 14 (4) from whooping-cough, 19 (4) from diphtheria, 99 (18) from diarrhœa and enteritis under two years, and 12 (4) from influenza. The figures in parentheses are those for London itself.

Worcester recorded the only death from enteric fever. Measles was fatal in 3 cases at Liverpool. Liverpool and Manchester each reported 2 deaths from diphtheria. Of the deaths from diarrhœa outside London, 21 were reported from Liverpool, 5 each from Hull and Birmingham, 4 each from West Ham and Bootle, 3 each from Birkenhead, Bristol, and Norwich.

The number of stillbirths notified during the week was 247 (corresponding to a rate of 38 per 1000 total births), including 44 in London.

OBITUARY

ERIC SLACK, O.B.E., M.B. Camb.

Dr. Eric Slack, who died last month in Switzerland in his sixtieth year, was the son of Dr. Robert Slack, of Derwent Hill, Keswick. He was educated at Fettes College and Pembroke College, Cambridge, the final years of his medical curriculum being spent at the Middlesex Hospital. Soon after qualifying in 1908 he joined the West African medical staff and took part in the campaign against sleeping sickness. After several years on the coast he was transferred to the hinterland to establish a segregation camp for sleeping sickness victims, where for many months he was cut off from the society of white men, and his chief friends were four baboons who made their home in his compound. On the outbreak of war in 1914 he returned to England and served later through the whole campaign in German East Africa. He was then employed in the transport of native African labourers from the east coast to Dieppe. After the war he took charge of the Basuto leper asylum at Maseru, finding it a task after his own heart, and for 11 years he devoted himself to the study of leprosy, visiting Honolulu and India, where he was able to exchange ideas with other workers. Unexpected illness overtook him and he returned to die in Switzerland, his wife's native country. A fellow student writes: "Eric Slack was a man who looked 20 years younger than his real age. He had a passion for exercise: he ran for his university in the cross-country race, and took part in Marathon races when well over 40. He frequently walked from London to Brighton; he loved his Cumberland fells and mountains, and was a member of the Alpine Club. In Africa he never allowed himself to be carried by the natives, but would always walk, however hot the tropical sun. His was a deeply religious nature but of an order which had the power of inspiration by its joyousness, humility, and courage."

MEDICAL NEWS

Fellowship of Medicine and Post-Graduate Medical Association

From Sept. 18th to 30th there will be a course in medicine and surgery at the Westminster Hospital. From Sept. 25th–30th an all-day course in chest diseases will be held at the Hospital for Consumption, Brompton. During the same week there will also be an afternoon course in proctology at the Gordon Hospital for Rectal Diseases. From Sept. 30th to Oct. 1st there will be a week-end course in rheumatism at the Royal Mineral Water Hospital, Bath. From Sept. 29th to Oct. 3rd a special tutorial course in medicine, surgery, and midwifery for men graduates only will be held at the Connaught Hall of Residence. Forthcoming courses include medicine, surgery, and the specialties at the Metropolitan Hospital from Oct. 2nd to 14th; dermatology at St. John's Hospital from Oct. 2nd to 28th; physical medicine at the London Clinic and Institute of Physical Medicine from Oct. 2nd to 25th; cardiology at the National Hospital for Diseases of the Heart from Oct. 9th to 21st. Further particulars may be had from the secretary of the Fellowship at 1, Wimpole-street, London, W.1.

Lectures on Tropical Hygiene

The London branch of the British Red Cross Society has arranged a course of seven lectures and demonstrations on tropical hygiene, which will be given at 5.30 P.M. on Mondays, Wednesdays, and Fridays, from Sept. 22nd, at 9, Chesham-street, Belgrave-square, London, S.W. The course, which is conducted by Colonel J. W. Leake, will cover such questions as food, clothing, and medical and sanitary precautions necessary for health in hot countries. Further particulars may be had from the county secretary at the address given above.

The Institute of Micro-Biology

At a meeting of the College of Pestology held on July 10th it was resolved that the name of the college should be changed to the Institute of Micro-Biology Incorporated, in consonance with a broadening of aim and objects. The new institute will embrace the study of bacteriology, biochemistry, and microbiology, as well as conducting research into the repression of noxious vermin and parasites, including "rats, mice, sparrows, ticks, fleas, mosquitoes, and flies, but not foxes or hares." It will hold examinations and successful candidates will be admitted as fellows or diplomates. It is also hoped to establish provincial centres and chairs or lectureships in the science of "pestology." The president of the institute is Mr. A. Moore Hogarth; the deputy president, Dr. F. R. Leblanc; the hon. director of the oral research clinic, Lieut.-Colonel P. J. Probyn, M.B.; and the hon. treasurer and director of the dermatological research clinic, Dr. G. Madden. The offices are at 52, Bedford-square, London, W.C.1, and the laboratory and clinics at 233, Pentonville-road, N.1.

King's College Hospital Medical School

On Saturday, Sept. 30th, from 2 to 6 P.M., there will be lectures and demonstrations to which members of the medical school and other practitioners are invited. The annual dinner of past and present students will be held on the same evening at 8 P.M. at the Connaught Rooms, Great Queen-street, Kingsway, London, W.C., when Mr. Arthur Edmunds will preside. The secretaries to the dinner committee are Dr. H. A. Lucas and Dr. M. S. Thomson.

A series of post-graduate lectures, free to all medical practitioners, will be delivered in the lecture theatre of the medical school on Thursdays at 9 P.M., from Oct. 12th onwards. The opening lecture, on deformities of the external genitalia, will be given by Mr. Edmunds, and subsequent lectures will be announced weekly in our Medical Diary.

Sterilisation in Switzerland

At the Royal College of Surgeons of England, Lincoln's Inn Fields, on Thursday, Sept. 28th, an address in French on Some *Aspects of Sterilisation in Switzerland* will be given by Prof. Hans Maier, director of the Zurich Mental Hospital, Burghölzli. The meeting will be held under the auspices of the International Federation of Eugenic Organisations (443, Fulham-road, London, S.W. 10), to which inquiries may be addressed. Any persons interested are welcome. The chair will be taken at 8 P.M. by Sir Humphry Rolleston, president of the Eugenics Society.

Hospital Staff and a Contributory Scheme

On August 12th (p. 388) we gave details of a dispute which had arisen between the honorary medical staff of the North Lonsdale Hospital, Barrow-in-Furness, and the council of that hospital. The council was asked to pay the medical staff 1 per cent. of the sum subscribed to the hospital's contributory scheme, but the request was refused, and resignation of the staff was imminent. A basis of settlement was eventually reached, but it was not until August 24th that the mayor of Barrow was able to announce full agreement. It is decided that if, in 1934, the ordinary total income of the hospital exceeds the ordinary total expenditure the excess of income up to an amount equal to 1 per cent. of the workpeople's contributions for the year shall be paid into the medical staff fund. In subsequent years in which income exceeds expenditure the fund will receive 1 per cent. of the contributions. The medical staff are not, however, to ask for any increase in the percentage until income exceeds expenditure by at least £750, or until 1938. A scale of income for members of the contributory scheme has been agreed upon, subject to the consent of a general meeting, and if this is adopted members whose income falls outside the prescribed limits will be entitled to maintenance only and not to treatment. It has also been decided that complaints affecting members of the staff shall go to the staff for consideration and report before any decision is made, and that except in case of accident or other emergency a patient shall not be admitted to the hospital except on the recommendation of a medical practitioner.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

PADDINGTON MEDICAL SOCIETY.
TUESDAY, Sept. 12th.—9 P.M. (at the Great Western Royal Hotel, Paddington). Dr. Victoria Bennett, Dr. J. Gossip,. Dr. Elsie Warren, Dr. W. M. Hewetson: Medical Experience in the Tropics.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.1.
MONDAY, Sept. 11th, to Saturday, Sept. 16th, 1933.—INFANTS HOSPITAL, Vincent-square, S.W.1. Course in Diseases of Infants, afternoons only.—BETHLEM ROYAL HOSPITAL, Monk's Orchard, Eden Park, Beckenham. Course in Psychological Medicine, Tuesday and Friday at 11 A.M. Individual clinics available daily by special arrangement with the Fellowship of Medicine.

Appointments

Certifying Surgeons under the Factory and Workshop Acts: ROBINSON, R. H., M.B., B.S. Durh. (Torquay, Devon); WRIGHT, M. C. (South Cave District, York, East Riding).

Vacancies

For further information refer to the advertisement columns.

Aylesford, Preston Hall Sanatorium.—Jun. Asst. M.O. £200.
Res. M.O. At rate of £150.
H.P. and Res. Cas. O. Each at rate of £100.
Birmingham, Royal Cripples Hospital.—H.S. At rate of £200.
Birmingham, West Heath Sanatorium, Northfields.—Jun. M.O. At rate of £150.
Bristol Royal Infirmary.—Jun. Asst. for Cancer Research Laboratory. £300.
Bristol, Southmead Municipal Hospital.—Asst. Res. M.O. £200.
Bucks County Council.—Deputy County M.O.H. and School M.O. £720.
Buxton, Devonshire Royal Hospital.—Asst. H.P. At rate of £150.
Cobham, Surrey, Schiff Home of Recovery.—Res. Surg. O. At rate of £200.
Connaught Hospital, Walthamstow, E.—Hon. Phys.
Dunedin, New Zealand, Otago Hospital Board.—Sen. Res. M.O. £500.
East Ham Memorial Hospital, Shrewsbury-road, E.—H.P. At rate of £150. Also H.S. to Special Depts., and Cas. O. Each at rate of £120.
Grimsby and District Hospital.—Jun. H.S. £150.
Hampstead General and N.W. London Hospital, Haverstock Hill, N.W.—Cas. M.O. for Out-patient Dept. At rate of £100.
Hastings, Royal East Sussex Hospital.—Hon. Anæsthetist.
Hospital for Sick Children, Great Ormond-street, W.C.—H.P. and H.S. Each at rate of £100.
Isleworth, West Middlesex County Hospital.—Part-time Visiting Pathologist. 3 gns. per session.
Lancaster, County Mental Hospital.—Asst. M.O. £500.
Leamington Spa, Warneford General Hospital.—Res. H.S. Also Res. Cas. H.S. and H.S. to Spec. Depts. Each at rate of £150.
Leeds City.—Asst. M.O.H. for Maternity and Child Welfare. £500.
Leeds General Infirmary.—Hon. Ophth. Surgeon.
Leeds, Herzl Moser Hospital, Leopold-street.—Res. M.O. £200.
Liverpool and District Hospital for Diseases of the Heart.—H.P. At rate of £100.
London Lock Hospital, Dean-street, Soho.—Res. M.O. At rate of £175. Also Surg. Reg. £100.
Middlesex County Council.—Asst. M.O. £600.
National Hospital, Queen-square, W.C.—Asst. Pathologist. £250.
Newcastle-upon-Tyne, Hospital for Sick Children.—H.P., Sen. and Jun. H.S.'s. Each at rate of £100.
Norwich, Norfolk and Norwich Hospital.—H.S. £120.
Nottingham General Hospital.—H.S. At rate of £150.
Oldham Royal Infirmary.—H.S. At rate of £175.
Oxford, The Warneford.—Jun. M.O. £300.
Portsmouth Royal Hospital.—H.P. and H.S. Each at rate of £130.
Preston and County of Lancaster Queen Victoria Royal Infirmary, Cas. O. £150.
Princess Beatrice Hospital, Richmond-road, Earl's-court, S.W.—Res. M.O. At rate of £110.
Queen's Hospital for Children, Hackney-road, E.—H.P., and Cas. O. Each at rate of £100. Also Asst. Surgeon.
Royal Chest Hospital, City-road, E.C.—Physician to Out-patients.
Royal Free Hospital, Gray's Inn-road, W.C.—Two Asst. M.O.'s. Each £350.
Royal National Orthopædic Hospital, 234, Gt. Portland-street, W.—Two H.S.'s. Each at rate of £150.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Hon. Surg. Reg.
St. John's Hospital, Lewisham, S.E.—Res. M.O. £200.
Scarborough Hospital and Dispensary.—Two H.S.'s. Each at rate of £175.
South-Eastern Hospital for Children, Sydenham, S.E.—Jun. Res. M.O. At rate of £120.
Stockport Infirmary.—H.S. £150.
Sunderland Children's Hospital.—H.P. £140.
Sunderland Royal Infirmary.—Sen. H.S. £200.
Throat, Nose and Ear Hospital, Golden-square, W.—H.S. £100.
Warrington, County Mental Hospital, Winwick.—Asst. M.O. £500.
Watford and District Peace Memorial Hospital.—Res. Surg. O. At rate of £150.
West Bromwich and District General Hospital.—Cas. H.S. At rate of £200.
West London Hospital, Hammersmith-road, W.—H.P., H.S. Also H.S. to Throat, Nose and Ear Dept. Each at rate of £100.
Western Ophthalmic Hospital, Marylebone-road, N.W.—Hon. Asst. Surgeon. Also Jun. Res. H.S. At rate of £100.
Willesden General Hospital, Harlesden-road, N.W.—Cas. O. At rate of £100.
Winchester, Royal Hampshire County Hospital.—H.P. At rate of £125.
Wolverhampton Royal Hospital.—H.P. At rate of £125.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Caerleon, Monmouth, and Buntingford, Hertford.

NOTES, COMMENTS, AND ABSTRACTS

UNEMPLOYED MEN IN CAMP

> "Ill fares the land, to hastening ills a prey,
> Where wealth accumulates, and men decay."

In the midsummer of 1932 six men went to Godshill, near Fordingbridge, in the New Forest, and established a camp. Now 50 men are living there; permanent huts have been built, roads have been made, a water-supply has been procured, and the inhabitants are leading busy lives cultivating the land and raising small livestock. Weaving, leather-work, and boat-building are among their other activities. They also find time for games, athletics, swimming, and dancing, and their physique is said to have greatly improved.

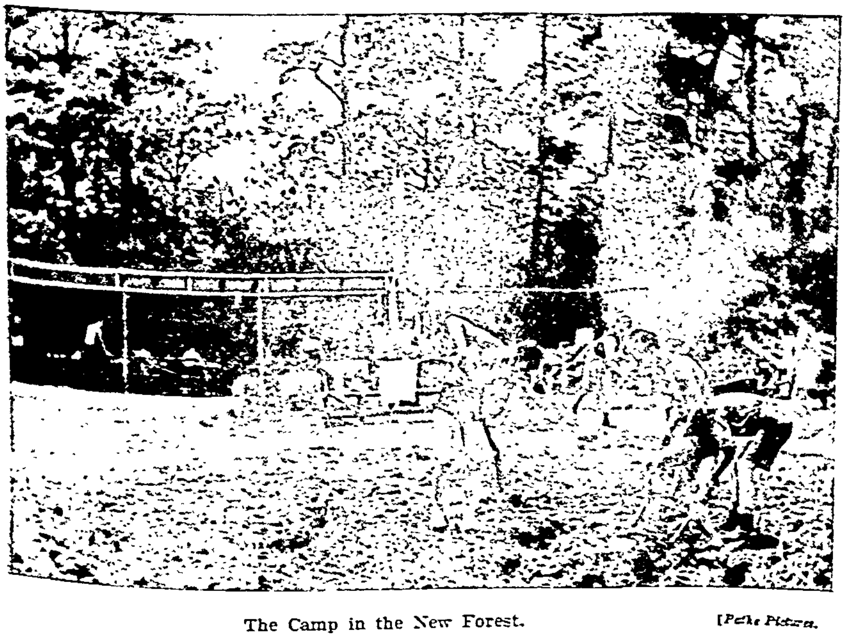
These achievements in themselves may not seem to be of great importance, but they mean a great deal to the people concerned; for all these campers are men to whom our present industrial system has been unable to offer employment. In the life of the camp they have found an interesting, healthy, and constructive alternative to the pointless inactivity which was formerly their lot. In a leading article on Feb. 11th of this year, which referred to the dangers of unemployment to the minds of the workless, we welcomed, as a hopeful sign, the spread of schemes to help them, and the campers in the New Forest have proved the value of an undertaking of this kind which is at once practical and ambitious.

Young people who have left school and have never been employed find it more difficult without the discipline of industrial conditions to adjust themselves to life. The camp is practical in that it offers in its many activities a substitute for this discipline. It is ambitious in that it offers something more. While unemployment itself is still such a pressing problem it might seem unnecessary to look towards the problems beyond. But mechanisation has made it probable that however the world is reorganised in the future there will in general be more leisure. Whether that leisure is divided among the whole population or whether it is forced upon one section of society in the form of unemployment, it is of primary importance that it should not bring degeneration of mind and body. The purpose of education, it has been said, is to enable a person to enjoy his free time; and one of the chief needs of the present is to bring this education within reach of the many who desperately need it.

The settlement in the New Forest is the first of the Grith Fyrd (Peace Army) Camps. Its success has encouraged the organisers to make plans to form a chain of such camps throughout England, and especially in the neighbourhood of the depressed areas. They will not, of course, conform to any rigid pattern, but the first may serve as a model to be adapted according to local conditions. The camps will be established in the country, but near industrial areas, thus making it possible to give a new environment without breaking off contact with home life. In the country, too, it is possible to obtain camp sites at a nominal rent with timber for building and land for cultivation.

Weaving cloth. [Pathé Pictures

The present camp is composed of unmarried young men between the ages of 18 and 25. Fifty will probably be the maximum number for any one community. The men are selected at interviews, and are medically examined before they are enrolled. They may accept no wages while they are in the camp, and, while each colony strives to be self-supporting, all competition with commercial concerns is strictly avoided. The men sign on for 18 months of camp life, unless in the meantime they should obtain employment, when of course they leave immediately.



The Camp in the New Forest. [Pathé Pictures

The 18 months are divided into three main stages of approximately six months each. The first half-year is spent doing team-work, such as camp construction and the cultivation of land, and in the provision of social life and recreation. This includes discussions, by groups, on political, economic, and religious subjects, while advantage is taken of educational talks on the wireless. The campers have organised classes among themselves, and also attend Workers' Educational Association lectures. The second six months is spent in making expeditions throughout the country. The men go about on foot in small groups with light camping gear. One party has recently undertaken a tour of 150 miles. They visit rural and industrial areas, dockyards, factories, mines, and farms. They get to know varied aspects of England and English life, and learn to assess national advantages and difficulties. It is hoped that what they observe during this period will awaken a sense of social responsibility, which in the third period they are asked to put into practice. Though the men may accept no wages they are in the last six months to be asked to undertake voluntary work which though non-economic is worth doing and will be of value to the country. For instance, the campers have promised to deal with local outbreaks of forest fire, and there is much regional survey work waiting to be done. Archæological excavation may be carried out under skilled supervision. Everywhere improvements can be carried out for the preservation of the countryside; there are slag heaps to be planted, and derelict buildings to be dismantled. Experienced campers are badly needed to help to run holiday camps for city workers. The qualities necessary for such work, self-reliance and leadership, are developed by life at the camp. Almost since the start the community at Godshill has been self-governing, a considerable part of the power being vested in an elected committee, whose chairman gives out the orders of the day. A camp chief sits on this committee to represent the organisers and subscribers.

A meal in the hut. [*Pathe Pictures.*

Most of the men at the camp are in receipt of unemployment benefit or transitional payment. The Ministry of Labour has agreed to pay these as long as the men undertake no paid work, and has exempted the men from the necessity of daily attendance at the local labour exchange. They go instead once a week to Fordingbridge to draw their money, which they pay into the camp funds to contribute towards their keep. Those who are not receiving benefit contribute £1 weekly. At the camp, which has now its full complement of 50 men, the cost (including 2*s*. pocket money per man per week, and fares for occasional visits home) comes to about 18*s*. 6*d*. per man per week. The transitional payment in the district is assessed as 10*s*. per week. The average amount paid into the camp fund per man per week is 12*s*. A weekly deficit of 6*s*. 6*d*. per man has therefore to be met. To establish a new camp with buildings suitable for winter occupation by 50 men works out at about £6 per man, provided land is obtained at a nominal figure, as in the case of the New Forest camp. The difference between income and expenditure, as well as capital for setting up further camps, has at present to be obtained by private subscription. Tools, building materials, and camp equipment are all urgently required, and gifts in kind, new or old, are gratefully accepted. When the camp is better equipped it will, of course, become more nearly self-supporting.

The organisers of the movement suggest that in the future the scheme may develop into true colonisation, and help to attract people from the congested industrial areas and establish them in farming communities on land selected with the help of the Land Utilisation Survey. Married couples would join these settlements, and the original camps might serve as training centres for the new colonists. Such plans can only be a matter for speculation, but the results that are shown by the camp in the New Forest are concrete, and seem to prove that here is a way of attacking the problem of the unemployed which is well worth trying. The outlay is small and the return is positive.

What has been done so far has been done by means of quite small sums subscribed by a few people, and we hope that wider knowledge of the work will bring fresh supporters. The organising secretary of the movement is Mr. Guy Keeling, and he may be addressed at Toynbee Hall, London, E.1.

LEGISLATION AGAINST QUACKERY IN ICELAND

THE chief medical officer of Iceland, Dr. V. Jönsson, has lately given an account [1] of the anti-quackery legislation which he was instrumental in introducing into Iceland last year, and which the Alting adopted with only two dissentient votes. He notes in parenthesis that the Alting's attitude towards quackery is now very different from what it was a score of years ago, when the quacks emerged triumphant from a parliamentary debate. It is possible that their triumph at that time may, indeed, have been the main cause of their downfall, and that during the intervening years the prosperity of quackery has aroused a suspicion and ill-will which has been its undoing. Be this as it may, the pendulum has swung pointedly away from all that smells of quackery, and last year's legislation is framed so as not only to paralyse the out-and-out quack, but also to inhibit certain tendencies prone to develop in some members of the medical profession. The new law is, in fact, as much directed against the irregular activities of regular doctors as against the misapplied enterprise of unqualified practitioners. Paragraph 15 opens with the generalisation that quackery of all sorts is forbidden in Iceland. There follows a seven-paragraph definition of quackery. It is impressively comprehensive:

(1) If anyone without a licence to practise medicine

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[1] Nordisk Medicinsk Tidskrift, June 3rd, 1933.

undertakes to treat patients professionally, advertises or calls himself a doctor, prescribes and supplies to his patients drugs which a chemist may not sell without a prescription;

(2) If a dentist extends his therapeutic activities beyond the realms of dentistry and gives a general anæsthetic, for example, or a dental mechanic dabbles in dentistry, or a specialist in massage treats patients without their being referred to him by a doctor, or a midwife administers a general anæsthetic or supplies drugs other than those which she is specifically qualified to dispense;

(3) If a doctor, not licensed as a specialist, poses in any way as a specialist, or a specialist poses as an authority in some branch of medicine in which he is no specialist;

(4) If a doctor recommends or prescribes an excessive and unnecessarily large quantity of drugs or does so solely to profit himself thereby, or if he advises, exclusively for his own benefit, an operation or other medical treatment for a disease for which such treatment is evidently unsuitable, or for a disease from which the person concerned is plainly not suffering;

(5) If a doctor prescribes or sells certain drugs ostensibly for medical purposes, although cognisant of their being required for other purposes (drugs of addiction) such as retail sale at a profit;

(6) If a doctor lends his name to the advertisement of drugs, medical equipment, foods, drinks, &c., in such a way that the public is liable to form an inaccurate opinion as to the real value of the said wares; and

(7) If a doctor "covers" the activities of unqualified persons, lending them his name so that the public believes their medical activities are authorised by him,

Then the person concerned is guilty of quackery.

This long and rather breathless definition of quackery will be seen to stamp as unquestionably illegal transactions which in many countries are merely regarded as shady. Paragraph 17 forbids everyone, even doctors and chemists, to advertise drugs and medical outfits and instruments. Drugs, instruments, hospital equipment, &c., may, however, be advertised in journals circulating only among doctors. It will be interesting to learn some years hence what is the opinion of the chief medical officer of Iceland on the effects of this legislation.

NEW PREPARATIONS

DIGOXIN.—The leaves of *Digitalis lanata* are held to have a greater cardiotonic action than those of *Digitalis purpurea*, and chemical investigations carried out in the laboratories of the Wellcome Chemical Works resulted in the discovery and isolation of a new crystalline glucoside, which has been named Digoxin. After pharmacological examination at the Wellcome physiological research laboratories the glucoside was submitted to the Therapeutic Trials Committee of the Medical Research Council for clinical investigation. The results of this trial have recently been published. They indicate that digoxin is a useful member of the digitalis series, being particularly valuable in the treatment of auricular fibrillation when rapid effects are desired. Digoxin is rapid in its action even when given orally, so that intravenous injection is unnecessary save in exceptional cases. As a pure substance with well-defined chemical and physical properties, digoxin provides a digitalis preparation of constant activity requiring no biological standardisation. It has now been made available by Messrs. Burroughs Wellcome and Co., Snow Hill Buildings, London, E.C. The following products are issued to the medical profession for oral administration, namely: "Tabloid" Digoxin 0·25 mg. (bottles of 25 and 100) and Solution of Digoxin 0·5 mg. in 1 c.cm. (bottles of 30 c.cm. and 250 c.cm.); for intravenous administration: "Hypoloid" Digoxin 0·5 mg. in 1 c.cm. (boxes of 10).

ASPIRIN.—We have received a specimen of the latest form in which Aspirin, as prepared by Messrs. Howard and Sons, Ltd., of Ilford. is distributed to the profession. The tablets are packed in a bottle containing 100 5-grain tablets, with the proper indication that the dosage is one to three tablets, and that it should be under medical control.

CONTRACEPTION IN THE UNITED STATES

IT is usually assumed that birth control is largely responsible for the fall in the birth-rate that has occurred in civilised countries during the last 70 years. Yet surprisingly few attempts have been made to find out how prevalent the practice is. This has led Prof. Raymond Pearl, of Johns Hopkins University, to start an inquiry in which data have been obtained from every woman delivered in the obstetric service of certain hospitals located in or near large cities east of the Mississippi. A preliminary report [1] furnishes particulars of 1390 white and 610 negro women, most of whom came from the lower social and economic levels. The average number of children born was 2·68 per white woman and 2·89 per negro. No less than 1409 women (70 per cent. of the total) denied ever using any birth control method, even coitus interruptus. The average number of years' exposure to pregnancy among those who attempted contraception was 4·40, and among those who did not 3·47. The mean number of pregnancies among women in the first group was 3·00 and 2·76 in the second, but Prof. Pearl gives good reason for supposing that the women in the first group were of a higher fertility than those in the second; moreover, the offspring of the first group contained a considerable number of wanted children. The commonest contraceptive methods employed were the douche (39·9 per cent.), the condom (29·0 per cent.), and the coitus interruptus (17·4 per cent.). Only 2·3 per cent. made use of a pessary. Since a method of which the pessary is an important part is advised in most of the British and American birth control clinics, these figures suggest that among the poor of the large cities in which the investigation was made (Baltimore, Philadelphia, Washington, Chicago, and New York) these clinics as yet exert little influence. To English eyes it is surprising that such a high proportion of couples should be found to use no methods of birth control, and also that coitus interruptus should be practised by so few.

AUSTRALIA'S BITING SPIDERS

CASES of spider-bite poisoning have been medically reported in Australia from the year 1863 onwards, and between 1927 and 1932 such poisoning was the cause of 7 out of the 17 deaths due to venomous bites in New South Wales. The three biting spiders of Australia are *Atrax robustus*, *A. formidabilis*, and *Latrodectus hasseltii*, and from the account given by Dr. W. Wilson Ingram and Mr. Anthony Musgrave [2] they are all to be avoided. *Atrax robustus* builds a funnel-shaped nest by the side of fence posts, under logs and stones, and in rotten tree stumps; the male spiders are large (24 mm. in length) and the females even larger; in colour they are black or reddish-brown. The results of a bite are alarming; within ten minutes of being bitten one woman, aged 25, turned pale, sweated, and was taken to hospital in a state of collapse; dyspnœa was marked, there was frothy fluid on the lips, and she had repeated attacks of retching. There was no local reaction, and her mentality was unimpaired, but analgesia of the whole body was noted, though the sense of touch remained. Her temperature rose to 100·4° F.; she gradually became cyanosed, and died from heart failure 13 hours after being bitten. Post mortem, she was found to have acute pulmonary œdema; the blood was very dark.

A bite from *A. formidabilis* produces similar symptoms, but the results of a bite from *Latrodectus hasseltii* are rather different. This is known, from its marking, as the "red-back," "red-spot," or "jockey spider" in Australia, but the Californian species is popularly called the "black widow." The spider builds in dark corners, in old tins, and flower pots: in country districts, where earth closets are in use, it often builds under the seat, and the genitalia are therefore a common site of the lesion. In a series of 98 cases recorded there were six deaths, though in some cases death occurred days or even weeks later, and was probably due to secondary infection. Pain is a marked symptom, and has been described as severe cramping, throbbing, sharp, dull, and aching; it may be confined to the region of the bite, or extend into the legs, abdomen, or chest, or indeed all over the body. Among other symptoms which have been noted are abdominal rigidity, sweating, restlessness, vomiting, constipation, cyanosis, dyspnœa, and in a few cases urinary retention and œdema of the face and legs. Leucocytosis is present in every case. The chief constituent of the venom of latrodectus is now agreed to be a neurotoxin, but a hæmolysin has also been described. No work has been published on the venom of *Atrax robustus*.

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[1] Human Biology, 1932, iv., 363.

[2] Med. Jour. Australia, July 1st, p. 10.

Treatment follows the lines found to be most effective in snake bite. If a limb is bitten a tourniquet is put on, the lesion is incised, and potassium permanganate is applied. When the genitalia are involved treatment is best directed to the avoidance of sepsis, and iodine or ichthyol may be applied to the lesion for this purpose. The general condition can be most successfully treated by administration of convalescent serum when this is available, or the intramuscular injection of whole blood from a patient who has recovered. Morphine and atropine are indicated in all cases, and should be given, it is suggested, with adrenaline or pituitrin to help combat shock. Where cyanosis and dehydration from vomiting are marked, saline may be given intravenously or per rectum. Faced with such a multiplicity of injections the patient may well feel that he would be happier left alone with his spider bite, but Ingram and Musgrave assure us that it is in his interest to be thus badgered. "Every case," they say, "especially of poisoning by *Atrax*, requires constant attention, and symptoms will have to be treated as they appear. . . . However hopeless a case looks, it will repay to persist with fluids and stimulants." Let us accept their dictum, and be thankful that in England we are spared both spider bites and their cure.

Hysteria in Dogs.—Dr. Geoffrey F. Cobb writes: "The annotation in your issue of Sept. 2nd suggests that canine hysteria may be due to deficiency of vitamins, chiefly of the 'A' group, in the diet. Dogs for the last century have been fed on a 'maintenance diet' of dog biscuit, yet I can trace no record of canine hysteria in the veterinary literature of the past. I suggest that with the in-breeding of dogs of to-day, 'over-domestication' and the projection of human traits on the dog is responsible for a purely environmental state termed 'canine hysteria.' Possibly, similar limitations imposed by 'civilisation' are conducive to analogous 'human hysteria'?"

The Beck Luminex.—The magnifier submitted for our inspection by Messrs. R. & J. Beck, Ltd. (69, Mortimer-street, W.1), is a useful and well-made little instrument. The source of illumination is skilfully concealed in the head or business end of the magnifier, the handle of which consists of the ordinary electric torch. With the eye-piece properly focused and adjusted on the object, a bright image magnified 10 times is obtained, without previous experience or instruction, by any observer with normal eyesight. For locating foreign bodies in the cornea it should prove valuable, and it may also be found of service for detecting lesions in dark areas such as the ear or nasal choanæ. On the surface of the skin also it may have its uses, especially for an observer not accustomed to the watchmaker's monocle and inclined to allow his head to come between the object and the source of the illumination. As it requires a hand to hold it, it is not suited to be an aid to any surgical procedure. The Luminex, with adjustable focus magnifying 10 times, complete with lamp and battery, costs £1 1*s.*

"Clinical Science."—In two recent issues we have referred to a new journal incorporating *Heart*, and edited by Sir Thomas Lewis, F.R.S., from University College Hospital medical school. When *Heart* was first issued 24 years ago there was evident need of a journal specially designed to publish original work on the physiology of the cardiovascular system, but from the beginning it was realised that the flow of suitable contributions would in course of time diminish, and it is now felt that the time has come to widen the scope of the journal in order to maintain its standard. The new title is *Clinical Science incorporating Heart*, and the normal rate of publication will be one volume, of about 400 pages, each year. The volumes will be in four parts, appearing at irregular intervals, and the annual subscription is £1 17*s.* 6*d.*, including postage. The publishers are Shaw and Sons, Fetter-lane, London, E.C.4.

A Dental Diary of Appointments.—We have received from the Dental Manufacturing Co., Ltd. (Brock House, Great Portland-street, London, W. 1), a copy of an appointment book for 1934, issued even a little earlier in the previous year than usual; but it would not be too early to order so convenient a diary. As usual, it contains three columns to a page and a week in an opening, with space for half-hourly appointments from 9 A.M. to 8 P.M. The notes on fees and regulations for dental benefit at the beginning of the book are well selected, and the address book at the end is equally practical. The price is 6*s.* 6*d.* plain, 7*s.* 6*d.* interleaved with blotting paper, 8*s.* interleaved with ruled paper; postage 6*d.* extra.

Births, Marriages, and Deaths

BIRTHS

Bloom.—On Sept. 4th, 1933, at Cranford, Gerrard's Cross, Bucks, to Barbara (*née* Owen), wife of G. F. Harrison Bloom, of 17, Welbeck-street, W.1—a son.

Hutchinson.—On August 28th, at Poona, India, the wife of Major Charles Hutchinson, R.A.M.C., of a daughter.

Keeble.—On August 30th, the wife of E. R. Keeble, M.B. Camb., Gerrard's Cross, of a son.

Morlock.—On Sept. 2nd, at Welbeck-street, W., the wife of H. V. Morlock, M.D. Lond., of a son.

Peterkin.—On Sept. 2nd, at Grosvenor-terrace, Hornsea, E. Yorks, the wife of J. H. Stuart Peterkin, M.B. Aberd., of a daughter.

Spero.—On August 29th, at Welbeck-street, W., the wife of Surgeon Lieut.-Commander L. P. Spero, Royal Navy, of a daughter.

Summers.—On Sept. 1st, at Burnham House, Burnham, Bucks, the wife of Maxwell H. Summers, M.R.C.S., of a daughter.

Wood.—On Sept. 1st, the wife of T. Nevill Wood, M.B. Camb., East Bergholt, of a daughter.

MARRIAGES

Adam—Atkinson.—On Sept. 2nd, at All Saints Church, Sanderstead, William Blane Adam, M.B. Glasg., to Maureen Grace, elder daughter of Mr. and Mrs. W. J. Garnier Atkinson, Woldingham, Surrey.

Attwater—Callaway.—On August 31st, at St. Luke's, Bournemouth, H. L. Attwater, F.R.C.S., Harley-street, W. to Doris Callaway, youngest daughter of Mrs. E. Callaway, Bournemouth.

Bell—Faure.—On Sept. 2nd, at Esher Parish Church, Arthur Capel Herbert Bell, F.R.C.S., to Hillegonda Anna Elisabeth, younger daughter of Mr. and Mrs. H. M. F. Faure, of Claygate.

Boyd—Loewenthal.—On August 21st, James Dixon Boyd, M.B. Belf., to Amélie, daughter of Mr. J. M'C. Loewenthal, Belfast.

Connolly—Matthews.—On August 29th, at the Catholic Church of St. Anselm and St. Cecilia, Kingsway, W.C., Richard Michael Connolly, L.R.C.P., to Frances, second daughter of the late Stephen Matthews, Birr Offaly.

DEATHS

Argles.—On August 30th, at Eastbourne, Ernest Argles, M.R.C.S., Divisional Medical Officer, London County Council, of Kenilworth Court, Putney.

Baker.—On Sept. 2nd, at Grove Lodge, Finchley, N., James Barrington Baker, M.D. Durh., in his 82nd year.

Davie.—On Sept. 4th, at St. Leonards-on-Sea, Arthur Melville Davie, L.R.C.P., L.D.S., of Hastings.

Morrison.—On August 29th, at Duffield, Derbyshire, Robert Morrison, L.R.C.P., aged 74 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

ADDRESSES AND ORIGINAL ARTICLES

SOME CONSIDERATIONS IN THE TREATMENT OF ACUTE SUPPURATION *

By F. D. Saner, F.R.C.S. Eng.
SURGEON TO THE ROYAL NORTHERN HOSPITAL, LONDON

Of recent years there has developed a different outlook on the treatment of acute inflammatory and suppurative conditions. Its outstanding feature is that the principle of rest in its widest sense has again been accepted as the essential basis of treatment. Since Hilton so ardently advocated rest more than sixty years ago, this principle has been, so to speak, submerged, because inflammation came to be regarded rather as a state of disease to be attacked than as a manifestation of a mechanism of defence of the body to be assisted by every means at our disposal in accomplishing its main objects—either resolution or suppuration.

During the immediate pre-war period reliance was placed mainly on multiple incisions, tubes, antiseptic irrigations and immersions, and frequent dressings. Several workers, notably Sir Almroth Wright, were pointing out at this time the futility of antiseptics for grossly infected wounds and emphasising the importance of the irrigation of a septic wound by its own tissue fluids, but only during the latter half of the war period was it more generally recognised that methods of treatment which permitted of greater freedom for natural repair to proceed, exaggerated or adapted to meet particular conditions, were the most likely to prove beneficial. The introduction of the salt pack, the Carrel-Dakin method of irrigation, and the application of B.I.P.P. to wounds, were indications of changing ideas, and though at the time any success of these methods was attributed mainly to the action of the particular chemicals employed, it was realised there was merit too in the diminution of interference with the wound itself and the consequently diminished pain and general disturbance. At the same time it was being demonstrated, especially by Meurice Sinclair, in cases of open infected fractures that if the limb was efficiently immobilised after drainage had been provided the wound could to a great extent be left to look after itself.

Some two or three years later Winnett Orr, dealing mainly with cases of acute osteomyelitis and infected open (civil) fractures, advocated enclosure of the limb in a plaster-of-Paris cast, leaving the wound untouched for several weeks. Such treatment was spoken of at the time as revolutionary, but it was in fact a reversion—with differences—to more primitive ideas and a logical sequence to the lessons of the war period brought about by one who had the vision to recognise and the courage to apply them.

In order to gain its full value, rest (and "warmth" must always be added) should be employed when the earliest signs of inflammation become manifest or, better, when an injury, however slight, but a potential site of infection, is received. In this connexion, if the pricked or cut finger, after promoting free bleeding, thorough cleansing, and protection, were immobilised by resting the arm in a sling for 48 hours, there is little doubt that the number of cases of septic fingers and hands, which crowd the departments of every hospital, would be diminished in numbers and in severity. In these minor injuries too much faith is placed in an application of iodine or other antiseptic, which in itself is inadequate.

Incisions

In order to liberate pus from a superficial abscess or one pointing subcutaneously, an incision should be made to expose the whole length of the abscess cavity. In many situations an ellipse of skin and subcutaneous tissue may be removed, thus avoiding the necessity of using tubes or gauze pack to maintain the opening. The wound thus made is covered by some non-adherent dressing—e.g., vaseline gauze—and, except for an occasional change of dressing, further interference is as a rule unnecessary. A similar procedure is employed in cases of suppuration in bone, with the addition, in acute osteomyelitis, that the length of diaphysis involved must be freely opened. Certain criticisms—mainly of "dirtiness"—have been brought against this method and are no doubt justified if the wound is left entirely untouched for weeks on end. Arrangement can be made for an occasional change of the top dressing (or of the plaster itself) or, if the wound has been packed, for renewing the packing with very little disturbance. Any unpleasantness can be avoided without in any way detracting from the merits this method has in fulfilling the essentials of relief of tension, immobilisation, warmth, and a minimum of interference with the wound itself.

After some years of experience of this treatment, in my opinion it can now be fairly claimed that in the general run of cases the depreciation of health formerly associated with bone suppuration is not nearly so marked, with the consequence that repair is hastened and convalescence shortened. It must be admitted that acute osteomyelitis has changed in character and the majority of cases are less severe than formerly. It may be added, however, that all cases should be under close supervision and no attempt made to use this method as a means of treating infected bone cases in an active stage in an out-patient department.

As a general rule, incisions should not be made in inflamed tissue until pus has definitely formed. Certain exceptions may be made to this, however, when an acute inflammatory process is spreading under cover of dense tissue, such as bone or palmar fascia, when the object of an incision is to provide a track, a line of least resistance to the surface for the products of inflammation, rather than to interfere with the area which is itself involved. A more difficult problem arises as to the immediate action indicated when an acute inflammation is spreading without pus formation. In some cases pus formation is delayed only, and sets in eventually; in others, fortunately the minority, it does not occur, while the inflammation becomes widespread leading almost inevitably to a fatal issue. Such conditions, while serious in any situation, are more immediately alarming when the face, scalp, or deep tissue of the neck are concerned, with the fear of spread to the inside of the skull or of respiratory difficulties. On no account should an area of inflammation on the face, in the nose, or on the lip, however small, be incised in a pre-suppurative stage; what appears perhaps to be but a painful pimple, an insect bite, or the early stage of a small carbuncle must be treated with the greatest respect in this situation as they are potential sources of the greatest danger, especially if pricked or cut before pus has formed. On occasion

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* Abridged from a post-graduate lecture delivered at the Royal Northern Hospital.

there appears to be no attempt at localisation and pus formation but instead a rapid spread of inflammation over the whole side of the face and perhaps the scalp and neck. It has been advocated that the angular vein should be ligatured on the affected side as a means of blocking one direct communication with the intracranial circulation. While my experience of this is limited to very few cases without benefit, it should be considered at an early stage as possibly helpful.

In cases of deep cellulitis of the neck respiratory difficulties may demand laryngotomy or tracheotomy; apart from this, however, incisions should not be made except to liberate or definitely explore for pus. As a rule, in this type of case deep pus is formed quickly and œdema of the respiratory tract is apt to be coincident with pus formation in the surrounding area. It may be possible therefore to avoid a laryngotomy, but in every case preparation should be made for it, since at any moment the dyspnœa may become urgent.

Appendicitis

The present knowledge of the means adopted by the tissues to arrest and counteract an infection is inadequate. There are unknown factors which it is not possible to alter, and though general measures (hygienic, dietetic, chemical, and ray therapy) are of considerable value, the responsibility still rests too much on the individual to save himself. In a few situations only is the opportunity given of entirely removing the site of an acute inflammatory process, to the great advantage of the individual. This opportunity occurs notably in acute appendicitis.

It is almost axiomatic now that if an appendix becomes the site of acute inflammation its removal, immediate or remote, is inevitable for the future safety of the individual. In recent discussions on this subject the main issue on the whole has been not so much the advisability of removal in all cases, though this is questioned by some, but when the operation can be performed with the greatest safety. As part, perhaps, of the general trend of policy in acute inflammatory conditions there has lately been a revival of what is known as the Ochsner-Sherren method of treatment of appendicitis during the acute stage and until it has passed or an abscess has formed. At the time when this treatment was originally advocated, the majority of cases at any rate were not seen, or not diagnosed, until an immediate pre-abscess or localised abscess stage had been reached, unless a perforation in the earlier stages of the attack had forced the recognition of a varying degree of suppurative peritonitis. The removal of an appendix in the first 12, 24, or 36 hours from the onset of symptoms must have been rare. It is therefore scarcely appropriate to apply any method of treatment now for the same reasons which may have been valid over twenty or more years ago; it is right, however, to discuss it in the light of present knowledge and as an alternative to be adopted should those immediately responsible deem it the safest course in a particular case.

When an acute inflammatory condition arises in any situation it is realised in most instances that suppuration will follow and on the whole the sooner it does so the better. If the appendix is involved, any delay in removal should be advocated with the knowledge that the inflammation is going to resolve—contrary to the usual termination—or if pus forms it is going to be discharged into the bowel, or that the appendix itself will become "shut off" in such a manner as to prevent spread of the inflammation or of pus. The fact that such things do happen does not palliate the dangers in the early stages; the uncertainty of future progress is then so great and the dangers of any particular case so difficult to assess that in the ordinary case, unless obviously mild or quietening, the immediate removal of the appendix must be regarded as the safest policy. The tissues are thus placed straightway in a position to repair and not left to resolve or localise an inflammatory process, a strain to which they may or may not be equal.

If an abscess has already formed and has been localised, it should be drained only and no attempt made at the time to remove the appendix for fear of damage to the abscess wall which, so to speak, is only just holding. During the period of drainage of the abscess the fate of the appendix cannot unfortunately be ascertained; it may be completely destroyed, or on the other hand a remnant or practically the whole appendix may be left in situ. On account of this uncertainty the appendix should be removed at a later date, and though on occasion such advice may prove to have been unnecessary, the experience of further serious trouble from appendices which have been left has been convincing.

There is the intermediate stage in the course of acute appendicitis when, so far as can be judged, the appendix itself has been "shut off" without pus formation outside the appendix. This stage does not correspond with any particular period of time in the attack. An inflamed appendix may be wrapped round with omentum within a few hours or by its position be covered with bowel; on the other hand at the third or fourth day (more especially in children) it may be found lying free in the general peritoneal cavity; localisation can only be roughly estimated by the degree of intensity of the local and general signs and symptoms. While each case should be judged individually and treatment not made to fit in with any particular theory which may be under discussion at the time, it is in this type of appendix case that, in my opinion, the actual method used for removal of the appendix assumes the very greatest importance.

The Gridiron Incision and Drainage

The body reacts to an acute inflammatory process in the abdominal (or thoracic) cavity in no different manner from that in which it reacts to one in any other situation. The first endeavour is to immobilise the structures immediately surrounding the process, and in the abdomen the movements of the abdominal wall and the intestines are at once slowed down and eventually brought to a standstill, while the peritoneum and omentum are used to try to keep the inflammation within limits and avoid spread to the general peritoneal cavity. These protective measures are initiated in the earliest stages and vary considerably in their success in different individuals, depending, to some extent at any rate, on the position of the appendix. The first consideration must be to avoid, as far as is possible, any disturbance of this protective mechanism. In no other situation in the body would there be any question of making an incision into an abscess, or potential abscess, otherwise than directly over the centre of it; in the wildest moment no one would advocate the opening of say an inguinal abscess from the buttock! Why, then, should it be taught that a median or paramedian abdominal incision is justifiable for the removal of an inflamed appendix which, except perhaps in its very early stages, is surrounded by structures endeavouring to keep the infection within bounds? Apart from the danger of spreading infection, the unavoidable handling of already "tired" gut, which such an incision entails, results almost inevitably in a varying degree of intestinal paresis. This disturbance is avoidable by the employment of the gridiron incision, when the small intestine is scarcely seen and certainly not handled; or, if a palpable mass is present, by an incision directly over the centre of the mass. The arguments usually put forward against the use of the gridiron incision are that difficulties may arise should the diagnosis prove to be wrong, or from lack of space if the appendix is not found immediately under the line of incision. Such difficulties can be easily overcome and, in my opinion, do not diminish in any way the great advantages gained by removing the appendix with a minimum of disturbance to the abdominal cavity in general and the small intestine in particular.

Again, the abdominal wall should not be completely closed after the removal of an appendix when it is uncertain if tension has been completely relieved, for example, in the presence of fluid which may be contaminated or when there is any marked degree of œdema of the gut wall, mesentery, or retroperitoneal tissues. In these cases there is still the possibility of continuation of the inflammation and spread of infection.

The use of the gridiron incision as the approach to the appendix and a ready willingness to drain the abdominal cavity rather than a keen desire to close it even with a risk, makes in my experience the removal of an inflamed appendix a very safe procedure, with a minimum of local or general disturbance at any period of its course, with the exception, as mentioned, during an abscess stage. The drainage of the cavity cannot yet be said to be satisfactory, inasmuch as it is impossible to expose completely an area of suppuration in the same manner as is possible in many other situations. Additional stab incisions are the means only, as a rule, of infecting fresh areas of the abdomen without a corresponding gain in the efficiency of the drainage. We depend still on the rubber tube which, on the whole, serves its purpose faithfully rather than with a high degree of efficiency. Its purpose should not be considered to aid discharge of pus through its bore (per se a rubber tube has no particular merit except its consistence), but as a suitable means only of creating and maintaining a line of least resistance to the surface as large as is possible, and as such its purpose is lost if the tube is removed before a track is definitely established.

THE RELATIONSHIP BETWEEN THE ANTI-ANÆMIC PRINCIPLES IN STOMACH AND LIVER

BY JOHN F. WILKINSON, M.D., M.Sc., PH.D. MANCH., M.R.C.P. LOND., F.I.C.
DIRECTOR OF THE DEPARTMENT OF CLINICAL INVESTIGATIONS AND RESEARCH, AND LECTURER IN SYSTEMATIC MEDICINE, UNIVERSITY AND ROYAL INFIRMARY, MANCHESTER; AND

LOUIS KLEIN, M.Sc., PH.D. LOND., F.I.C.
BIOCHEMIST IN THE DEPARTMENT

SINCE the recognition of the value of liver and of hog's stomach in the treatment of pernicious anæmia much attention has been devoted to the nature of the active anti-anæmic principles in these two organs and their mutual relationship.

The work of Cohn, Minot, and their co-workers [1] suggests that the liver active principle may be an ω-amino or imino-acid, but its constitution remains undecided. In previous communications [2 3] we showed that the active principle in hog's stomach, for which we proposed the term "hæmopoietin," was more unstable than, and had different properties from, the active principle in liver. We tentatively suggested that hæmopoietin was of an enzyme-like nature and that by its action on the proteins or some other substance present in a normal diet it could produce the liver active principle, or a similar substance, which might be stored in the liver until required for the formation of red blood-cells. In the present paper we report further experiments which appear to confirm these views as to the enzyme nature of hæmopoietin and its relationship to the liver principle. We have also been able to demonstrate the formation, outside the body, of the liver active principle or a similar substance, without the use of liver, by the action of hæmopoietin on beef—a change which hitherto has been believed to take place only in vivo.

The cases of pernicious anæmia used in the following experiments for the purpose of testing the hæmopoietic activity of unknown material were all carefully chosen according to the rigid criteria already laid down by one of us,[4] and although for brevity we have omitted in the text the preliminary control periods, these were carried out in every case. All the clinical tests were made at least in duplicate, usually in triplicate.

Experiments with Fractions obtained from Hog's Stomach

I.—EFFECT OF FRACTION P5 AND FRACTION P5 (MUCOSA)

In previous communications [2 3] we described a hæmopoietically active fraction "P5" obtained by precipitating with alcohol the press juice from hog's stomach. We found that this fraction in initial doses of 5 g. daily gave very satisfactory responses in cases of pernicious anæmia; thus, in another case tested recently, we obtained a reticulocyte peak of 42·1 per cent. on the thirteenth day whilst the red blood-cells (R.B.C.) and hæmoglobin (Hb.) showed rapid increases.

Case 280.

Day of treatment.		
1st ..	R.B.C. 1,230,000	Hb. 28 per cent.
34th ..	R.B.C. 3,000,000	Hb. 82 „

When the press juice obtained from the mucosa of hog's stomach was precipitated with alcohol a fraction "P5 (mucosa)" was obtained; this was similar in its properties to the ordinary fraction P5, though it appeared to be somewhat more active peptically and hæmopoietically. The usual yield of fraction P5 (mucosa) was 18–22 g. per 500 c.cm. of press juice (from mucosa), 1 g. being thus derived from approximately 50 g. of mucosa. The effects of this fraction on the blood picture of two illustrative cases of pernicious anæmia were as follows:—

Case 23. [5 g. of fraction P5 (mucosa) daily for first 12 days, then 2 g. daily.] Maximum reticulocyte response: 59·7 per cent. on the tenth day of treatment.

Day of treatment.		
1st ..	R.B.C. 1,256,000	Hb. 35 per cent.
22nd ..	R.B.C. 3,232,000	Hb. 67 „

Case 305. [5 g. of fraction P5 (mucosa) daily.] Maximum reticulocyte response: 30·1 per cent. on the ninth day of treatment.

Day of treatment.		
1st ..	R.B.C. 1,952,000	Hb. 41 per cent.
19th ..	R.B.C. 3,168,000	Hb. 68 „

II.—EFFECT OF FRACTIONS P5 (I) AND P5 (II)

When fraction P5 was dissolved in dilute hydrochloric acid and the solution was precipitated with acetone, a fraction P5A was obtained which, though active peptically, was quite inactive in the treatment of pernicious anæmia. The use of acetone in fractionation experiments has therefore been avoided, since it appears to inactivate hæmopoietin.[3]

A fractionation of fraction P5, however, has been achieved in the following way. The solution in dilute hydrochloric acid was brought up to pH=4·2, when there was a precipitate of fraction P5 (i), which appeared to contain most of the pepsin. This fraction, though highly active peptically, was inactive hæmopoietically, a case of pernicious anæmia receiving 7·5 g. daily for 24 days showing no improvement in the blood picture.

The filtrate from fraction P5 (i), after adjustment to pH=6·2 and precipitation with alcohol, yielded a hæmopoietically active fraction P5 (ii). The chemical details of manipulation are described elsewhere.[3]

Fraction P5 (ii) was practically free from pepsin, but administration to two patients with pernicious anæmia in daily doses of 5 g. showed that it possessed considerable hæmopoietic activity; thus in Case 295 the reticulocytes gave a peak of 26·7 per cent. on the eighth day of treatment, followed subsequently by rapid rises in the red cell count and hæmoglobin.

III.—THE INACTIVATION OF FRACTION P5 BY HEAT

Five grammes of fraction P5 and 100 c.cm. of water were heated to 60–65° C. for half an hour, cooled and administered daily for ten days to Case 351. There was no hæmopoietic response. Since a daily dose of 5 g. of fraction P5 is very active in the treatment of pernicious anæmia, it is evident that heating to 60–65° effectively destroys the activity of hæmopoietin. The peptic activity was also destroyed under these particular conditions.

Incubation of Beef with the Stomach Fractions

Incubation experiments were carried out as follows: minced lean beef-steak was added to the experimental fraction in tap water, and after thorough mixing was incubated at 37° C. with occasional stirring. All the incubation mixtures had a slightly acid reaction. For example, in experiment VIII.*b* a small portion of the clear filtered liquid had pH=5·7 at the beginning, after four hours and after six hours incubation. Originally we used the crude stomach press juice fractions, but the following experiments have been carried out with fraction P5 or more purified products derived from it.

IV.—INCUBATION OF BEEF WITH FRACTION P5 (MUCOSA)

The material resulting from the incubation of a mixture of 100 g. of beef, 2 g. of fraction P5 (mucosa), and 120 c.cm. of water for two hours was given to Case 343 daily. An extremely good response was obtained, the reticulocytes rising to the very high maximum of 62·2 per cent. on the fifteenth day of treatment, thereafter gradually falling to normal values. There were also rapid rises in the red cell count and hæmoglobin percentage:—

Day of treatment.				
4th	..	R.B.C. 1,130,000	....	Hb. 24 per cent.
14th	..	R.B.C. 1,990,000	....	Hb. 52 „
28th	..	R.B.C. 3,700,000	....	Hb. 60 „

Since 2 g. of fraction P5 (mucosa) alone would have given a much smaller response, it is evident that incubation of this fraction with beef caused a very marked increase in hæmopoietic activity.

V.—INCUBATION OF BEEF WITH FRACTION P5 (I)

(*a*) Case 345 received daily for ten days the material resulting from the incubation of a mixture of 100 g. beef, 5 g. of fraction P5 (i), and 120 c.cm. water for two hours. There was no hæmopoietic response.

(*b*) Case 357 received daily for twelve days a similar product, but incubated for three hours instead of two hours. There was no hæmopoietic response. This case was subsequently used in experiment VIII.*b*.

The negative results obtained in experiments V.*a* and V.*b* further demonstrate the inactivity of fraction P5 (i), and since it consists very largely of pepsin confirms the previous observations that the incubation of beef muscle and pepsin also yields a hæmopoietically inactive product.

VI.—INCUBATION OF BEEF WITH FRACTION P5 (II)

A mixture of 100 g. of beef, 2 g. of fraction P5 (ii), and 120 c.cm. of water was incubated for two hours and given daily for fifteen days to Case 350. There was a definite reticulocyte peak of 11·2 per cent., and slow improvement of red blood-cells, indicating some hæmopoietic activity of the product.

VII.—EFFECT OF HEATING FRACTIONS P5 AND P5 (MUCOSA) BEFORE INCUBATION WITH BEEF

(*a*) A mixture of fraction P5 (5 g.) and water (200 c.cm.) was heated to 60–65° C. for half an hour to inactivate the hæmopoietin, and then incubated for six hours with 150 g. of beef. The strained juice was given daily for eight days to Case 372 without hæmopoietic response.

(*b*) A mixture of 2·5 g. of fraction P5 (mucosa) and water (200 c.cm.) was heated to 60–65° C. for half an hour to inactivate the hæmopoietin and then incubated for six hours with 150 g. of beef. The strained juice was given daily to Case 368 for twelve days without hæmopoietic response. Thus it is clear that the hæmopoietic activity of these stomach fractions is destroyed by heating to 60–65° C. for thirty minutes.

VIII.—INCUBATION OF BEEF WITH FRACTION P5 FOLLOWED BY ENZYME INACTIVATION

(*a*) Beef (100 g.), fraction P5 (5 g.), and water (120 c.cm.) were incubated for two hours at 37° C., heated to 60–65° C. for half an hour to inactivate any remaining hæmopoietin and cooled. The product was given daily to the previously used Case 351 for a further twelve days. There was a definite reticulocyte peak of 18·2 per cent. on the eighth day, indicating some activity in the product. Better results were obtained when the time of incubation was increased as in the next experiment.

(*b*) A mixture of beef (150 g.), fraction P5 (5 g.), and water (200 c.cm.) was incubated for six hours at 37° C., heated to 60–65° C. for half an hour, cooled, filtered, and the clear liquid given daily to Case 357. A good response was obtained, the reticulocytes rising to a maximum of 22·4 per cent. on the ninth day of treatment. There were also rapid rises in the red cell count and hæmoglobin.

Day of treatment.				
3rd	..	R.B.C. 1,440,000	....	Hb. 35 per cent.
22nd	..	R.B.C. 2,440,000	....	Hb. 64 „

These results are shown graphically in the accompanying Figure.

IX.—ACTIVE INTRAMUSCULAR PREPARATION FROM EXPERIMENT VIII.*b*

A product similar to that described in experiments VIII.*a* and VIII.*b* was prepared in a form suitable for injection. Since a product similar to or identical with the "liver active principle" appears to be formed in these experiments, the method used was similar to that used for obtaining a fraction containing the liver active principle from liver extracts suitable for intramuscular injections.

A mixture of 4 kg. of beef, 80 g. of fraction P5, and 4 litres of water was incubated at 37° C. for six hours. After heating to 60–65° C. for half an hour in order to destroy the excess hæmopoietin and leave only such "liver active principle" that may be formed, the clear liquid was treated with alcohol to a concentration of 70–75 per cent. and filtered from the large protein precipitate. A light brown solid (43 g.) was obtained on working this filtrate up in the usual manner. It did not possess any appreciable blood-depressant properties.

This product (SI1) dissolved in the minimum amount of water and sterilised by filtration through a Seitz filter when given intramuscularly to Case 370 over twelve days produced a reticulocyte peak of 19·1 per cent., and there were excellent increases in the red cell count (from 1,160,000 to 2,500,000) and hæmoglobin percentage (from 31 per cent. to 74 per cent.) without further treatment. This response was more striking than it would appear from the figures, since the patient during a control period of fourteen days was in a very severe and progressive relapse, losing 700,000 red blood-cells per c.mm. in fourteen days.

Discussion of Incubation Experiments

The results of the above incubation experiments are summarised in Table I., which shows the hæmopoietic activity of various hog's stomach fractions alone and when incubated with beef under varying conditions. Inspection of this Table reveals a number of features of fundamental interest and importance. It will be noticed that we have demonstrated that although hæmopoietin in the form of the relatively crude fractions P5, P5 (mucosa), or P5 (ii) is active in the treatment of pernicious anæmia, the activity is destroyed on heating with water to 60–65° C. for half an hour. Moreover, control experiments showed that beef taken alone is inactive, and that it is also inactive when incubated with fraction P5 or fraction P5 (mucosa) which had previously been inactivated by heating to 60–65° C. with water. If, however, a mixture of an hæmopoietin-containing fraction [P5, P5 (mucosa), or P5 (ii)], beef, and water is incubated at 37° C. an active product is obtained, *the activity of which is no longer destroyed by heating to 60–65° C. for half an hour.* In other words, during the incubation the heat-labile active hæmopoietin has been converted into or has produced a hæmopoietically active product that is now heat-stable. The conclusion seems to be justifiable that the hæmopoietin has acted on a constituent in beef muscle and produced another substance similar to or identical with the relatively heat-resistant "liver active principle" itself. This represents a synthesis of the latter from beef protein and the gastric enzyme, hæmopoietin, *outside the body.* If the liver active principle is really present in the above incubation mixture, it should be possible to obtain similar hæmopoietic responses more readily by injection than by mouth. This we have successfully accomplished. Stomach preparations have not been given successfully parenterally, since it is not possible to remove proteins from the preparations without removing hæmopoietin. Active liver preparations, however, can be easily freed from the bulk of the inert protein material.

TABLE I.—*Showing Responses in Cases of Pernicious Anæmia to Various Stomach Fractions and Incubation Mixtures*

Hæmopoietically active.	Hæmopoietically inactive.
Fraction P5 alone. Fraction P5 (mucosa) alone. Fraction P5 (ii) alone.	Fraction P5 (i) alone. Beef and water alone. Beef + pepsin + water incubated at 37°. Fraction P5 + water heated 60–65° half an hour.
Fraction P5 or P5 (mucosa) incubated with beef + water at 37°. Fraction P5 (ii) + beef + water incubated at 37°.	Fraction P5 or P5 (mucosa) + water heated 60–65° half an hour and then incubated with beef at 37°. Fraction P5 (i) + beef + water incubated at 37°.
Fraction P5 + beef + water incubated at 37°, then heated 60–65° half an hour. Fraction P5 + beef + water incubated at 37°, then heated 60–65° half an hour, and filtrate worked up for parenteral administration.	

The product of the incubation of fraction P5, beef, and water was therefore heated to 60–65° for half an hour to destroy hæmopoietin and after removal of proteins worked up into a product containing the "liver active principle" suitable for intramuscular injection. This was hæmopoietically active when tested clinically.

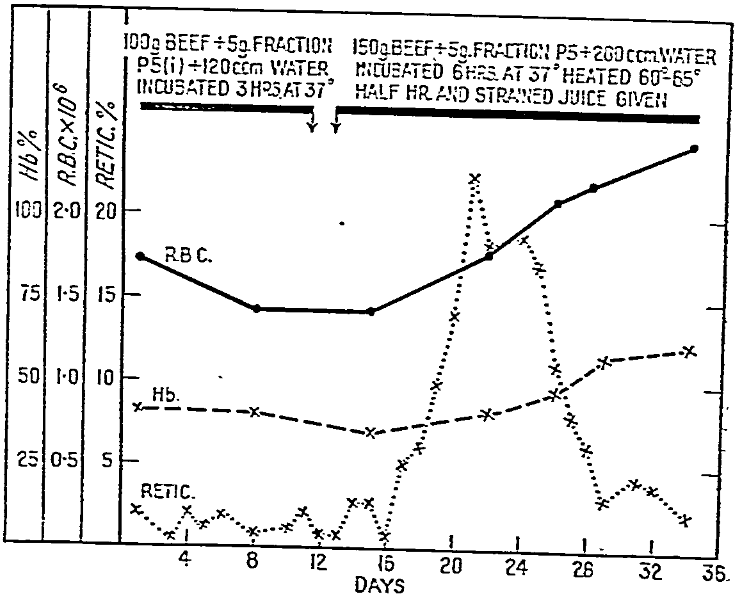

Chart showing behaviour of hæmoglobin, red blood-cells, and reticulocytes in a patient under treatment with incubated beef and stomach extracts.

Peptic Activities of Preparations from Hog's Stomach

One of us (Wilkinson [4]) has shown that the pepsin content of desiccated preparations of hog's stomach usually runs parallel to the hæmopoietic activity, since any conditions which inactivate pepsin during the desiccation process also appear to destroy the very sensitive hæmopoietin. Peptic activity determinations have therefore been carried out on all our fractions, using a modification of the well-known egg-albumin method.

TABLE II.—*Showing Peptic and Hæmopoietic Activities of Fractions from Hog's Stomach*

Preparation or fraction.	Time taken to digest egg-albumin.	Effect on cases of pernicious anæmia.
Scale pepsin	2–3 min.	Not active.
Fraction P5 (mucosa) ..	4–5 "	Active.
" P5 (i)	4–5 "	Not active.
" P5	7 "	Active.
" P5A	9 "	Not active.
Desiccated hog's stomach	10–12 "	Active.
Fraction P5 (ii) ..	40 "	"

Reference to Table II. shows that in the cases of the more highly purified stomach fractions peptic activity and hæmopoietic activity do not necessarily go hand in hand. For example, fractions P5 (i) and P5A are strongly active peptically, but inactive hæmopoietically, whilst, on the other hand, fraction P5 (ii) has strong hæmopoietic activity but contains very little pepsin. Moreover, the experimental evidence that the active principle in hog's stomach is not pepsin is conclusive.[5, 6, 7]

Conclusions

The experiments described in this paper confirm the evidence previously put forward [2,3] that the anti-anæmic principles in hog's stomach and in liver are not identical, and that the stomach active principle, hæmopoietin, acting on some substance present in protein food, produces a hæmopoietically active thermostable substance similar to or identical with the liver active principle.

The chief differences between the two active principles can be summarised as follows:—

(1) Hæmopoietin cannot be extracted from hog's stomach by methods which yield active extracts when applied to liver.

(2) Hæmopoietin is precipitated with the proteins when alcohol is added to hog's stomach press juice so as to give an alcoholic concentration of 70–80 per cent.[2,3] The liver active principle, on the other hand, is always found in the filtrate obtained after the removal of proteins with alcohol of this concentration.[1]

(3) Hæmopoietin differs from the liver active principle in being extremely sensitive towards heat and chemical treatment. For example, solutions of the liver active principle can be concentrated in vacuo at 60° C. for prolonged periods, or even boiled for a few minutes without very great loss of activity. Under these conditions hæmopoietin is completely inactivated.

These and other similar facts led us to the view [2,3] that hæmopoietin might possibly be of the nature of an enzyme. Confirmation of this view is found in the incubation experiments just described, in which it is shown that the incubation of heat-labile active stomach fractions with beef gives rise to hæmopoietically active material which is now relatively resistant to heat. These experiments find a counterpart in those of Castle and his co-workers,[5] who found that normal human gastric juice, when predigested in vitro with the proteins of beef muscle, was able to induce remissions in cases of pernicious anæmia. It was suggested, therefore, that there was an "intrinsic" factor of an enzyme nature in normal gastric juice which, reacting with the proteins of beef muscle (the extrinsic factor), gave rise to active material. One of us (Wilkinson [7]) has, moreover, shown that when normal gastric juice is given *with protein food*—e.g., beef—to patients suffering from pernicious anæmia, a reticulocyte response does occur, although the juice is quite inactive when administered alone. It appears that gastric juice though inactive when given alone is active (*a*) when incubated in vitro with protein food or (*b*) when administered orally with protein food.

The hypothesis has, therefore, been put forward that pernicious anæmia is due to a deficiency in the gastric juice or gastric mucosa of an unidentified substance of an enzyme nature. We have already previously termed this substance "hæmopoietin," [2,3] and there seems to be every reason for believing that it may be identical with Castle's "intrinsic" factor. Hæmopoietin is only of value when it is allowed to interact with a substance that is present in gastric muscularis and is also a constituent of beef muscle. Strauss and Castle [8] have recently suggested that this "extrinsic factor" is possibly vitamin B_2, since they found that autolysed yeast (Vegex or Marmite) when incubated with normal gastric juice gives rise to hæmopoietically active material. This conclusion, however, is invalidated by the fact that several workers,[9,10,11] including ourselves, have obtained responses in cases of pernicious anæmia by the use of marmite *alone*. Moreover, Wills and Naish[12] have shown that when an extract of egg white rich in vitamin B_2 is incubated with gastric juice, no response is obtained. Evidently the extrinsic factor and vitamin B_2 are not identical. Wills [13] has also shown that marmite (but not brewer's yeast extracts or dried yeast) is active in the treatment of tropical and other macrocytic anæmias, which resemble pernicious anæmia in responding to liver preparations. The hæmopoietic factor in marmite appears to be soluble in water and in 80 per cent. alcohol, and to be heat-stable. In these properties it resembles the liver active principle rather than hæmopoietin, and from our present knowledge there seem to be very good reasons for considering the possible identity of the hæmopoietic factor in marmite and the liver active principle.

The following relationship between the active anti-anæmic principles in stomach and liver is suggested as a result of our incubation experiments in part described in this paper:—

Enzyme.		Substrate.		End-product.
Hæmopoietin, the stomach active principle (Castle's intrinsic factor).	+	Unknown constituent of beef or gastric muscle (Castle's extrinsic factor).	→	Liver active principle.

The distribution of these three factors in various natural and artificial products is now under investigation.

The almost invariable association of pernicious anæmia with deficient enzyme secretion (achylia gastrica) [14] harmonises with the above scheme. Moreover, complete or partial removal of the stomach has been followed in a few of the cases reported [15] by an anæmia of the pernicious type.

The superiority of the hog's stomach treatment over oral liver therapy is also readily accounted for by the above scheme, since an active dried stomach preparation contains the enzyme, the substrate, and possibly the end-product of their interaction.

Finally, it is interesting to note that whilst the livers obtained from various omnivorous, carnivorous, and herbivorous animals and fishes (but not those obtained from patients dying from pernicious anæmia) have approximately the same therapeutic value in the treatment of pernicious anæmia, stomachs from herbivorous animals do not appear to possess any marked hæmopoietic activity, and are unsuitable for the treatment of pernicious anæmia.[7]

Summary

1. The preparation of various concentrates containing hæmopoietin, the active anti-anæmic substance in hog's stomach, is described.

2. Evidence that hæmopoietin is much more unstable than, and has different properties from, the active anti-anæmic principle in liver is reviewed.

3. When stomach fractions containing the thermolabile hæmopoietin are incubated with beef or stomach muscle, hæmopoietically active material is obtained which is relatively heat-resistant. These experiments are considered to effect in vitro the synthesis of a substance similar to or identical with the liver active principle.

4. It is therefore considered that the enzyme hæmopoietin by acting on some substance present in protein food—e.g., beef—may produce in vivo a substance which is stored as the active principle found in liver until it is required for red cell formation.

5. Hæmopoietin is present in the normal stomachs of man, carnivorous animals, and omnivorous animals, but has not been found in the stomachs of herbivorous animals.

6. The available evidence goes to show that true pernicious anæmia is a type of deficiency disease characterised by the absence from the gastric secretion of a specific enzyme, hæmopoietin, in addition to the pepsin and hydrochloric acid.

7. The evidence for the enzyme nature of hæmopoietin is based on (*a*) experiments with gastric juice; (*b*) incubation experiments involving the action of the thermolabile hæmopoietin on an extrinsic substrate (beef or stomach muscle) giving a relatively heat-resistant product similar to or identical with the active liver principle; (*c*) the invariable association of pernicious anæmia with deficient enzyme secretion; (*d*) the difficulty of extracting hæmopoietin from stomach tissue; (*e*) its apparent destruction by the prolonged action of pepsin and trypsin; (*f*) its association with the protein fraction of stomach press juice; (*g*) its instability; and (*h*) its sensitiveness to chemical treatment and heat.

We again acknowledge the willing coöperation and help of our University and Infirmary colleagues throughout this work; of Messrs. Boots Pure Drug Co., Ltd., of Nottingham, for generously making and supplying in quantity at our request various products and fractions; and of the Medical Research Council for a grant that has enabled one of us (L. K.) to take part in this work, which is being continued.

Addendum.—Since this paper was submitted for publication, Fouts and Zerfas[16] have reported that the potency of liver is increased by incubation with fresh stomach tissue. This is readily explained on the basis of our experiments described above, since the hæmopoietin present in the gastric mucosa finds its necessary substrate in the fresh gastric and liver tissues.

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PARENTERAL ACRIFLAVINE IN THE TREATMENT OF GONORRHŒA

BY E. HUGHES, M.B. LIVERP., D.P.H.
ASSISTANT MEDICAL OFFICER OF HEALTH, WEST BROMWICH; LATE MEDICAL OFFICER, VENEREAL DISEASE DEPARTMENT, ROYAL INFIRMARY, LIVERPOOL; AND
C. ALLAN BIRCH, M.D. LIVERP., M.R.C.P. LOND., M.M.S.A., D.P.H.
HONORARY ASSISTANT PHYSICIAN, ROYAL INFIRMARY, WIGAN; ASSISTANT MEDICAL OFFICER, SEAMEN'S DISPENSARY, LIVERPOOL; LATE SENIOR MEDICAL REGISTRAR, ROYAL INFIRMARY, LIVERPOOL

THE flavines are a group of synthetic dyestuffs whose therapeutic properties were first discovered by Ehrlich, the best known of them being acriflavine or 3·6 di-amino-methyl-acridinium chloride. This dye has been extensively used as a bactericidal agent and has been given by mouth and by subcutaneous or intramuscular injection in addition to being used as an external application. Although it has been used as an irrigating fluid, and also by mouth, in the treatment of gonorrhœa, it is only comparatively recently that records of its parenteral administration have been made. It was, nevertheless, used as long ago as 1921 in Liverpool by the late Dr. F. P. Wilson, but was abandoned because intravenous injections led to a high incidence of thrombosis.

Browdy[1] in 1921 treated several cases of gonorrhœa with 200 c.cm. of a 1 in 1000 solution of acriflavine intravenously, and reported seven days' cures with no relapses and no adverse symptoms. More recently Murray,[2] using 5 c.cm. of a 5 per cent. solution intravenously, found that it produced no better results than older methods, and in certain cases caused liver damage.

During the last 12 months over a hundred male patients with acute gonorrhœa have been treated at the Liverpool Royal Infirmary with subcutaneous or intravenous injections of acriflavine. Many patients, however, ceased to attend hospital before they were completely cured, so that the following *account deals with 50 cases only*. We ourselves have abandoned flavine therapy owing to certain toxic effects, but it is hoped that other workers will record their experiences with this drug, so that the mass of facts obtained will enable an accurate estimate of its value to be formed.

The drug used was neutral acriflavine, and it was first given subcutaneously; 1 to 3 c.cm. of solutions in sterile water varying from 1 to 5 per cent. all produced local pain when administered "deep subcutaneously" by a careful technique in which the needle was plunged into the gluteal muscles and then withdrawn slowly with a skew motion until it was felt to "click" as the point emerged from the capsule of the muscle, at which point the drug was injected. A solution of acriflavine in isotonic glucose also produced pain. One patient developed an intractable abscess in the buttock, and in another patient the site of injection broke down about two months later. Because of these local ill-effects we later gave acriflavine intravenously, using 10 c.cm. of a 1 per cent. solution three times a week. Our object was to keep the patient continuously under the influence of acriflavine, but in some cases, owing to irregular attendance, it was not possible to administer the drug regularly.

Most patients showed no ill-effects, but sometimes vomiting, a feeling of fullness in the throat, and a burning pain in the rectum were noted immediately after the injection. Two cases showed a profuse blotchy rash about 36 hours after the first two injections. The delayed toxic effects are described later.

SUMMARY OF RESULTS

The 50 cases were all treated until apparently cured, i.e., until—

(1) The discharge had ceased even after instrumentation.

(2) The prostate was normal in size, and the "prostatic bead" contained either no pus cells or a very occasional pus cell only.

(3) The urethra was normal on urethroscopy.

The average duration of attendance of all cases was 116 days, the shortest being 12 days (having had 0·275 g. of acriflavine) and the longest being 273 days (having had 0·65 g. of acriflavine). The average amount of drug given was 0·66 g., and the maximum 1·62 g. All cases had, in addition to acriflavine, irrigation with potassium permanganate, 1 in 8000, and potassium citrate by mouth, but no vaccines. A few cases had a restricted fluid intake with a view to concentrating the acriflavine in the urine. The average duration of treatment in these cases was 91 days.

Complications.—Three patients developed acute unilateral epididymitis when on treatment with acriflavine. Details of these cases are as follows:—

(1) Developed epididymitis 58 days after onset of disease, having received 1·62 g. acriflavine; 30 days later the epididymis was normal, but 221 days after onset he still had an occasional pus cell in his "prostatic bead." This patient attended irregularly.

(2) Developed epididymitis 29 days after onset of disease, having received 0·7 g. acriflavine; 18 days later the epididymis was normal, but 142 days after the onset he still had pus cells in his "prostatic bead."

These two cases are not included in the 50 cases referred to above because they are at the time of writing not completely cured.

(3) Developed epididymitis 57 days after onset of disease, having received 0·445 g. acriflavine. He received 0·2 g. acriflavine after this complication arose. Epididymitis disappeared after 77 days, and 210 days after the onset he was apparently cured.

There were no cases of acute suppurative prostatitis. Three patients had acute gonococcal arthritis of the wrist when they commenced treatment, and took 190, 187, and 126 days respectively before the joint condition and urethritis were cured. We have observed that when acriflavine is beneficial the discharge ceases very quickly, but it tends to recur and the total duration of treatment is not reduced. This effect appears to be most marked when the drug is given deep subcutaneously. A combination of subcutaneous and intravenous therapy seems to offer no advantage.

Delayed toxic effects.—In two cases jaundice occurred.

(1) Aged 20. Total acriflavine given, 0·825 g. (0·175 g. by deep subcutaneous injection and remainder intravenously). Urethritis cured in 101 days. Jaundice appeared 133 days after the last injection of acriflavine and lasted 22 days. The patient had the general symptoms of a catarrhal jaundice. The skin was deeply pigmented but there was no itching. Bile-pigments were present in the urine and the stools were pale. There was no pyrexia. The van den Bergh test showed a prompt direct reaction and a quantitative reading of 4 units. The liver and spleen were definitely enlarged and the enlargement gradually disappeared as the jaundice cleared. Wasserman reaction negative.

(2) Aged 32. Total acriflavine given, 0·9 g. (all intravenously). Jaundice appeared 93 days after last injection of acriflavine and lasted 60 days. Urethritis not completely cured when last seen. (This patient is not included in the above series of 50 cases.) Jaundice had been present about a week before the liver was enlarged. The spleen was not palpable. Three weeks after the onset of jaundice the van den Bergh test showed a direct positive reaction and a quantitative reading of 5 units. The lævulose-tolerance test was normal at a time when the jaundice was marked.

In both these cases the severity of symptoms and their duration were more marked than in the average case of catarrhal jaundice, and constitutional disturbance was considerable.

In many cases slight yellow tinting of the skin occurred very soon after intravenous administration of acriflavine, and was presumably due to the acriflavine in the blood stream. We did not notice any staining of the conjunctiva. It was found that a solution of acriflavine containing 0·00025 g. in 100 c.cm. was approximately as yellow as normal blood plasma. We used no chemical test for acriflavine in blood-serum, but it was noted by one of us (E. H.) that in the second case the blood-serum was definitely fluorescent 117 days after the last injection. It would appear, therefore, that in acriflavine jaundice the drug remains in the blood for a long period. In cases with no liver damage the maximum period at which fluorescence was observed in the serum after injection of 0·1 g. was five days. In many cases it had disappeared in 48 hours. Jaundice also occurred in a case of mixed syphilitic and gonococcal infection seven days after the last injection of neokharsivan (total 5·25 g.). Two acriflavine injections (total 0·2 g.) had also been given between the seventh and eighth injections of neokharsivan on account of a relapse of gonorrhœa which had not been treated originally with acriflavine. This was the only case in our series in which neokharsivan and acriflavine were both administered.

It appears from the above cases that acriflavine must be added to the long list of substances which may damage the liver. The causal relationship between acriflavine and jaundice is supported by the evidence of Murray,[2] who found a much higher incidence of jaundice of a catarrhal type in patients under treatment with acriflavine than in a control series.

The liver damage might be lessened by the administration of glucose by mouth before each injection of acriflavine. Repeated quantitative van den Bergh reactions during treatment will detect jaundice when latent, so that the drug can be discontinued before clinical jaundice appears. The icterus index of the blood plasma is an easier (if less accurate) means of measuring bilirubinæmia, but the yellow coloration due to acriflavine makes the test unreliable in these cases.

CONCLUSIONS

(1) Acriflavine given by deep subcutaneous injection will cause urethral discharge to disappear quickly but relapses are common and local pain at the site of injection makes it unsuitable for use in an outpatient clinic.

(2) Acriflavine therapy is not without danger. Jaundice is apt to appear after a long latent period. Deep subcutaneous injection may lead to local pain and abscess formation.

(3) Acriflavine appears to lessen the incidence of complications, but has no beneficial effect when these are established.

We are indebted to Mr. R. Stopford-Taylor for permission to record these findings.

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THE VALUE OF THE MENINGOCOCCAL COMPLEMENT-FIXATION TEST

A SEROLOGICAL STUDY OF ONE HUNDRED CASES WITH SYMPTOMS OF MENINGITIS

By H. A. Cookson, M.B., F.R.C.S. Edin., D.P.H.

HON. PATHOLOGIST, ROYAL INFIRMARY, SUNDERLAND; PATHOLOGIST TO SUNDERLAND MUNICIPAL HOSPITAL; BACTERIOLOGIST, COUNTY BOROUGH OF SUNDERLAND; AND

J. Elliott Sinclair

LABORATORY TECHNICIAN, SUNDERLAND ROYAL INFIRMARY

The continued occurrence of fairly numerous cases of cerebro-spinal fever makes it desirable to investigate all possible methods of diagnosis; this is sometimes difficult in the septicæmic and abortive forms where the cerebro-spinal fluid may be sterile and may even show a normal cytology.

In a previous communication from this department[1] an attempt was made to estimate the value of the complement-fixation test as an aid to diagnosis in meningococcal infections. Sera from 34 known cases of cerebro-spinal fever were tested, as well as 125 sera derived from other (non-meningitic) cases. The results corresponded almost exactly with the diagnosis arrived at by other means. It was felt, nevertheless, that the practical utility of the test could be gauged better by employing it in a series of consecutive cases, initially diagnosed as "meningitis," than by selecting known positives and negatives. Our purpose now is to present the results obtained in 100 such cases, in all of which the diagnosis of cerebro-spinal fever had to be considered or was definitely made.

The technique used for the test was that of the standard Wassermann reaction (No. 1 in the Medical Research Council's Special Report Series No. 14), as in the previous series. A modification of the method of preparing the antigen was, however, introduced: instead of using a mixed suspension of local strains of meningococci as before, all four types were included in known proportions. A saline suspension of pure cultures was used, containing in each cubic centimetre 90 million type III., 60 million type I., and 50 million each of types II. and IV.—a total of 250 million cocci per c.cm. The reason for using a preponderance of type III. was the prevalence of infections of this type in recent cases and in a previous epidemic in this district.

Of the 100 consecutive sera tested with this antigen, 43 gave varying degrees of complement fixation. Only 1 of these could be regarded as a false positive, this being a case of cerebellar tumour (tuberculoma) without evidence of meningococcal infection; there was, however, no opportunity to examine the nasopharynx for meningococci. The other 42 cases giving positive complement-fixation tests were all diagnosed clinically as cerebro-spinal fever, which was confirmed in 33 of them by finding the meningococcus in the cerebro-spinal fluid; of the others not thus confirmed, all but 3 showed a polymorphonuclear exudate in the cerebro-spinal fluid, but the organism could not be found.

There were 57 sera which gave no complement fixation whatever; in 28 of these the initial diagnosis of possible cerebro-spinal fever was supported neither by the clinical progress nor by the findings in the cerebro-spinal fluid. Of the remainder, 15 were proved to be cases of meningitis due to organisms other than the meningococcus—tuberculous, streptococcal, pneumococcal, and influenzal cases. We are left with 14 cases, clinically typical of cerebro-spinal fever, with polymorphonuclear exudates in the theca, in 7 of which meningococci were found but which gave no complement fixation. The negative result in 8 of these 14 cases may be attributable to the fact that the blood was taken during the first three days of illness. Therefore, out of 56 cases clinically and otherwise definitely suffering from cerebro-spinal fever, 42, or 75 per cent., showed complement fixation with a meningococcal antigen.

There were 3 cases in this series clinically typical of meningococcal meningitis, in which the cerebro-spinal fluid was clear and contained neither organisms nor excess of cells; the positive complement-fixation test was the only laboratory confirmation available. It is in such cases, where the meningitis is confined to the base of the brain, and in septicæmic, abortive, and relapsing cases, that this test is likely to prove of most value in diagnosis. Many of the cases of so-called "aseptic meningitis" would probably be found to give positive meningococcal complement-fixation reactions.

SUMMARY

1. Complement fixation with meningococcal antigens appears in the serum of at least 75 per cent. of cases of cerebro-spinal fever.

2. In a few cases where examination of the lumbar puncture fluid is negative or where none can be obtained, the complement-fixation test may be of great value in the diagnosis of meningococcal infections.

3. A positive reaction in a case with meningeal symptoms is practically diagnostic of a meningococcal infection; a negative reaction, however, does not necessarily exclude this.

We wish to thank Dr. A. S. Hebblethwaite, medical officer of health for Sunderland, and Dr. E. Thorp, medical officer at the Sunderland Fever Hospital, for the use of material from the cases under their care; and Dr. W. M. Scott, of the Ministry of Health, for much valuable assistance in the typing of cultures.

TUBERCULOUS MENINGITIS IN ADULTS

A REVIEW OF TWENTY-NINE CASES

By A. Hillyard Holmes, M.D. Manch.,
M.R.C.P. Lond.

HONORARY ASSISTANT PHYSICIAN, MANCHESTER ROYAL INFIRMARY; VISITING PHYSICIAN, WITHINGTON HOSPITAL, MANCHESTER

Tuberculous meningitis is much more common in children than in adults. Descriptions of the condition in medical text-books rarely differentiate between the symptoms seen in young children and those seen in older patients better able to describe their symptoms and to coöperate in the examination. The literature of the subject contains very few papers dealing with the disease in adults, those of Warrington[1] and Murray[2] standing almost alone. Warrington drew attention to the invasion symptoms in adults and Murray to the characteristics of the cerebro-spinal fluid. It was Warrington's paper, and the fact that 15 of these 29 cases were seen during the two years 1929–30, that suggested the present review. No preconceived intensive study according to any scheme has been attempted; the cases are reviewed on the basis of personal observation during routine hospital and private work.

The diagnosis was confirmed in every case either by finding tubercle bacilli in the cerebro-spinal fluid during life or by post-mortem examination. No patient recovered. No attempt was made to determine whether the bacilli were of human or bovine type.

Of the 29 cases, 21 occurred between the ages of 15 and 30. The youngest patient was 15 and the oldest was 50, the average age being 26. Between the ages of 15 and 20 there were 12 cases; from 21 to 30 there were 9 cases; from 31 to 40 there were 5 cases; and between 41 and 50 there were 3 cases. Males numbered 15 and females 14.

PROVISIONAL DIAGNOSIS

It is instructive to note the diagnoses made before or immediately after admission to hospital. Only 2 of the cases were originally diagnosed as meningitis, one on the seventh day of illness, and one on the fourteenth day. In only 6 other cases was the first diagnosis that of some cerebral lesion, the earliest being the seventh day of illness. Two cases were sent into hospital as suffering from nervous debility, and one as a case of neurosis. Influenza was the provisional diagnosis in 7 cases, pneumonia in 2, uræmia in 2; among other provisional labels were bronchitis, pulmonary tuberculosis, pleurisy, retention of urine, gastritis, tuberculous salpingitis, and encephalitis lethargica.

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[1] Cookson, H. A., and Thorp, E.: Edin. Med. Jour., 1932, xxxix, 253.

CLINICAL COURSE

Early Symptoms.—The records of symptoms before admission to hospital are incomplete; rarely was there any note of the temperature or pulse, or of the day on which various symptoms appeared. During the first week of illness the order of frequency of symptoms seems to have been as follows: headache (12 cases), vomiting (8), backache (5), constipation (4), pyrexia (3). Other early symptoms included coma, delirium, strangeness of manner, general pains, drowsiness, and irritability.

Case 5, seen on the first day, had been unconscious 18 hours; death occurred on the fourth day; post-mortem examination showed hæmorrhages into the mid-brain.

Case 16, provisionally diagnosed as pneumonia and uræmia, was seen on the third day, complaining of headache, vomiting, and backache; albumin was present in the urine, which yielded a culture of *B. coli*; the blood-urea was 23 mg. per 100 c.cm.

Case 6, seen on the fourth day as a case of influenza, was strange in manner; cervical rigidity appeared on the sixth day, when tubercle bacilli were found in the cerebro-spinal fluid; the patient died the following day.

Case 23, when seen on the fifth day, showed only headache, constipation, and pyrexia; the patient lived 17 days.

Duration of Illness.—The onset of illness was uncertain in 9 cases, but reasonably certain in the remaining 20. Of these, the average duration was fourteen and a half days; 1 patient lived twenty-two days. Apart from the patient who died on the fourth day from hæmorrhages into the mid-brain, the shortest duration was seven days, and only one other patient lived less than ten days; 11 lived more than fifteen days. The longest survival after tubercle bacilli had been found in the cerebro-spinal fluid was eleven days; 7 patients survived a week or more after the diagnosis had been thus confirmed.

Temperature, Pulse, and Respiration.—The temperature was usually irregular, ranging between 97° F. and 101° F. In only 4 cases did the temperature rise above 102° F.; in 12 cases it never rose beyond 100° F.; and in 4 cases the highest temperature recorded was 99° F.

Case 4, admitted to hospital *as a case of neurosis*, was clinically positive on the sixth day, when the temperature was 97·4°, pulse-rate 88, and respiration-rate 22; the diagnosis was confirmed by autopsy.

A terminal rise of temperature was seen in four instances:—

Case 6 rose to 104°, although when the clinical signs and spinal fluid were positive the temperature was only 99°.

Case 13 had a maximum temperature of 100° for two weeks; on the day of death the temperature rose from 98° to 105·2°.

Case 14 showed a terminal rise to 105·4°; previously the range had been from 98° to 101°.

Case 28 had for five days a temperature of 102°–103°, which rose to 105° on the day of death.

A terminal fall of temperature was noted in four instances:—

Case 1 showed normal or subnormal temperature for 48 hours before death; previously it had reached 101·8°.

Case 2, with a maximum temperature of 101·4°, showe only 97°–99° for five days preceding death.

Case 16 showed a similar range for a week before deat

Case 19, with a maximum temperature of 101·8°, on registered 96·2° on the day of death.

The pulse-rate was only above 120 at any tin in 10 of the cases; 8 cases never showed a puls rate higher than 100.

Case 4, when *clinically and bacteriologically* positiv showed a temperature of 102·6°, a pulse-rate of 76, ar a respiration-rate of 20.

Case 11, when clinically positive, had a temperature 99·2°, a pulse-rate of 56, and a respiration-rate of 20. the post-mortem examination a frontal tuberculoma wa found, with localised meningitis.

Case 12, when clinically positive, had a temperature 100·6°, a pulse-rate of 80, and a respiration-rate of 20.

Case 28, on the eighth day, was clinically positive wit a temperature of 102·6°, a pulse-rate of 76, and a respira tion-rate of 20; for five days while the temperature range between 102° and 103°, the pulse-rate was between 8 and 104.

In only 9 cases was the respiration-rate ove 30 per minute at any stage of the illness; in 9 case it was never above 24. One case with pulmonar tuberculosis had a respiration-rate of 40; 1 with a abscess in the neck had a rate of 48; 3 cases wit uncomplicated meningitis had rates of 39, 40, an 44 respectively.

Neck Symptoms.—Under this heading are include pain in the nape of the neck at rest, pain on passiv flexion of the head, resistance to flexion and actua extension of the head. The phenomenon was note in 18 cases, and was absent in 4 cases throughou the illness. The earliest record of its appearance wa in Case 6, where it was noted on the fifth day. On patient survived ten days and 2 others lived nin days after rigidity of the neck appeared; in one o these (Case 7) the cerebro-spinal fluid containe tubercle bacilli a week before death. In all, 8 case survived five or more days after cervical rigidity appeared.

Case 17 *showed no neck signs on the fourteenth day* although the temperature was 102° F., and the flui contained tubercle bacilli.

Case 10 had a flaccid neck on the day before death, ye the fluid yielded tubercle bacilli four days previously, an the patient had been in coma for those four days.

Two of the cases in which this sign was absent came to post-mortem examination: Case 3 showed no excess o fluid, and there were only very small tubercles at the base of the brain, which were scarcely noticeable; Case 11 was the one in which a frontal tuberculoma was found, with only localised adjacent meningitis.

Eye Signs.—Inequality of pupils, dilatation of both pupils, or loss of the light reaction was noted in 18 cases. The abnormal sign sometimes disappeared later in the illness. Case 7 showed dilated pupils which later became normal, and a squint which disappeared later; in Case 20 the pupils were first dilated and equal, later they were unequal, and later still they became equal again. Case 9 illustrated the disappearance of a squint. Case 28 showed dilatation of one pupil and loss of the light reflex by the fourth day; no other case showed pupillary signs before the ninth day. Strabismus, diplopia or ptosis was noted in 11 cases only, the earliest date of their appearance being the eighth day. Nystagmus was present in 2 cases, and photophobia in 3. Swelling of the optic disc or retinal congestion was observed in 6 cases.

The absence of all abnormal eye signs was noted in Case 2 on the eighth day, when the general clinical picture was positive and tubercle bacilli were present

TABLE SHOWING RESULTS IN TWENTY-NINE CASES OF TUBERCULOUS MENINGITIS IN ADULTS

Case No.	Sex.	Age.	Day first seen.	Early provisional diagnosis.	Other clinical Tb. foci.	Cerebro-spinal fluid.								Day of death.	Post-mortem findings.
						Day of exam.	Clear or turbid.	Pressure.	Coag.	Lymphocytes per c.mm.	Total protein per cent.	Glob.	Tb. bacilli.		
1	F.	17	14	..	? Lungs.	15	C.	+	..	120	..	+	+	19	—
2	M.	16	5	Bronchitis.	"	8	C.	+ +	..	..	..	..	+	15	—
3	F.	20	? 5	Frontal tumour.	..	? 11	C.	Normal	..	..	..	..	..	? 14	No excess of cerebro-spinal fluid. Tb. meninges and ileum.
4	F.	32	7	Neurosis.	..	No fluid obtained.								13	Tb. meninges; fluid + +.
5	F.	16	? 1	Cerebral.	Lungs, perit.	? 2	C.	+	..	3	0·12	+	—	? 4	Tb. lungs, peritoneum, meninges.
6	M.	20	4	Influenza.	Lungs.	6	C.	+ +	..	+ +	..	+	+	7	Tb. lungs, kidney, spleen, meninges.
7	M.	20	9	Cerebral tumour.	..	11	C.	..	+	185	0·2	+	+	18	Tb. lungs, kidney, spleen, glands. meninges.
8	F.	19	? 7	Influenza.	..	? 12	T.	..	..	250	0·4	+	+	? 22	—
9	F.	30	12	Pneumonia.	Lungs.	13	T.	N.	..	108	0·2	+	+	16	—
10	M.	38	? 14	Pulm. Tb.	"	? 14	T.	+	+	114	0·15	+	+	? 19	—
11	M.	24	14	Pleurisy.	"	..	..	..	..	..	..	..	..	18	Tuberculoma frontal lobe, meninges, lungs.
12	M.	25	? 10	Uræmia. ? enceph.	..	? 12	T.	+ +	+	140	0·125	+	+	? 14	—
13	M.	21	? 7	Influenza.	..	? 15	T.	..	+	118	0·25	+	+	? 23	—
14	F.	45	? 7	"	Neck gl.	? 10	C.	+	+	146	0·2	+	+	? 13	—
15	F.	30	14	Mening.	..	15	C.	N.	+	28	0·2	+	+	16	—
16	F.	27	3	Pneumonia. Uræmia.	..	11	T.	+	+	330	0·3	+	+	12	—
17	M.	34	14	Influenza.	..	14	T.	N.	+	239	..	+	+	19	—
18	F.	19	10	Cerebral.	..	10	T.	..	+	135	0·25	+	+	14	—
19	M.	15	7	Retention of urine.	..	9	C.	+	..	Polys. + +	..	..	+	9	General miliary Tb.
20	M.	25	7	Enceph.	..	10	T.	+ +	+	48	0·3	+	+	18	—
21	F.	37	? 14	Nerv. deb.	? Lungs.	? 16	C.	+ +	+	..	0·2	+	+	? 16	—
22 (a)	M.	41	8	Cerebral.	..	8	C.	+ +	..	75	0·15	..	—	..	—
(b)						11	T.	+ +	+	68	0·2	+	+	22	—
23	F.	16	5	Influenza.	Neck gl.	11	C.	+ +	+	64	0·1	+	+	17	—
24	F.	19	7	Gastric.	..	9	T.	..	O.	240	0·1	+	+	10	—
25	F.	21	?	Tb. salping.	..	No fluid obtained.								?	Salpinges, meninges, lung.
26	M.	21	7	Tb. mening.	Lungs.	No puncture made.								17	Lungs, meninges, abdominal glands.
27	M.	50	?	Cerebral. Art.-scler.	..	" " "								?	Tb. meninges only.
28	M.	18	8	Influenza.	..	9	C.	N.	O.	79	0·09	..	+	13	—
29	M.	39	? 13	Debility.	..	? 13	T.	..	+	26	0·16	..	+	? 22	—

in the lumbar puncture fluid; four days later the pupils were unequal. Case 7 showed no abnormal eye signs on the fifteenth day, four days after tubercle bacilli had been found in the cerebro-spinal fluid, although on the ninth day the pupils had been unequal and there had been transient diplopia. Case 25 showed complete paralysis of the left oculomotor nerve two days before death. Coma did not abolish ocular signs.

Pyramidal Signs.—Under this head are included spasticity of the limbs, increased tendon-jerks, ankle-clonus, Kernig's sign, and an extensor plantar response. Six cases showed none of these signs for periods of from one to eight days after the cerebro-spinal fluid yielded tubercle bacilli (Cases 8, 9, 10, 15, 18, and 28). Case 15 was negative in this respect on the fifteenth day of illness; Case 8 showed no pyramidal signs two days before death, which occurred presumably on the twenty-second day of illness. Case 9 showed no pyramidal signs through an illness lasting sixteen days.

The pyramidal signs were sometimes very slight when the case was clinically and bacteriologically positive; between the ninth and fourteenth days of illness 1 such case showed only slight spasticity; 2 showed exaggerated knee-jerks only, and in 4 cases only Kernig's sign was present.

Case 3 illustrated the disappearance of an extensor plantar response after it had been present for three days. No case presented all the pyramidal signs; Case 2 showed increased knee-jerks and Kernig's sign when the plantar response was flexor; Case 5 had increased knee-jerks and an extensor plantar response when there was no Kernig's sign and no ankle-clonus. Case 7 had a flexor plantar response and absent knee-jerks in the presence of spasticity and a Kernig's sign. During coma the pyramidal signs were sometimes present, sometimes absent; Cases 9 and 10 showed none during coma; Case 13 when in coma had exaggerated tendon-jerks in the legs and an extensor plantar response. Kernig's sign was very inconsistent, even though the case was clinically and bacteriologically positive; in six such cases it was absent, and in eleven it was present.

Mental Symptoms.—In all but 5 of the cases some alteration of mentality or behaviour occurred. This took the form of strangeness of manner, irritability, delirium, or apathy. These mental symptoms were only noted within the first week of illness in 3 cases, and in 13 cases did not appear until the tenth day or later. Only 8 cases showed delirium at any stage of the illness; 6 cases evinced marked irritability; and 5 were strange in manner.

Case 3 answered sensibly and even smiled at times on the day of death. Case 7 was delirious on what appeared to be the third day of illness; at this stage she "slept all day and talked all night," which gave rise to the provisional diagnosis of encephalitis lethargica; by the ninth day she was mentally confused; on the twelfth day she was apathetic; by the fifteenth day irritability was marked; she died on the eighteenth day of illness.

Coma appeared on the day of death in ten cases; in four cases it was present the day before death; Case 2 was in coma for three days, Case 1 for four days, and Case 10 for five days.

THE CEREBRO-SPINAL FLUID

The fluid obtained by lumbar puncture was examined in 23 cases. In 3 cases lumbar puncture was not performed; in 2 cases no fluid could be obtained; and in one case the fluid, being normal in appearance and not under increased pressure, was not sent for laboratory examination. Of the 23 cases examined, 22 gave positive findings for tubercle bacilli, though 1 of these, the only case examined twice, was negative on the eighth day and positive three days later.

The earliest day on which tubercle bacilli were found was the sixth day of illness (Case 6); in Case 2 they were present on the eighth day, and Cases 19, 24, and 28 showed them on the ninth day.

In only one case were the polymorphs (91 per cent.) in excess of lymphocytes (Case 19); this was on the ninth day of illness; Case 29 showed equal numbers of polymorphs and lymphocytes; in all the other cases lymphocytes were in excess. Their number per cubic millimetre ranged from 3 in Case 5 (presumed second day of illness) to 330 in Case 16 on the eleventh day of illness; Case 15 showed only 28 on the fifteenth day; Case 20 showed 48 on the tenth day; Case 24 showed 240 on the ninth day; 12 cases gave lymphocyte counts of over 100, and of these four were over 200.

A coagulum was present in 14 of the specimens containing tubercle bacilli, and was only recorded absent in 2 such cases. The fluid was clear in 10 and turbid in 12 of the positive cases. No relation between turbidity and cell counts was indicated; clear fluids gave lymphocyte counts varying from 28 to 185, three being over 140; turbid fluids contained between 26 and 330 lymphocytes per c.mm., seven being under 140.

The total protein and the globulin contents of the fluid had no relation to turbidity; five clear and nine turbid fluids contained over 0·150 per cent. of total protein; eight clear and eleven turbid fluids showed excess of globulin. The total protein varied from 0·99 per cent. to 0·4 per cent.; 11 cases gave readings of 0·2 per cent. or more. Varying cell counts were found in the presence of equal amounts of total protein; Cases 23 and 24 each had 0·1 per cent. protein, their lymphocyte counts being 64 and 240 respectively; Cases 20 and 16 each had 0·3 per cent. of protein with lymphocyte counts of 48 and 330.

The pressure of cerebro-spinal fluid was not measured by a manometer; the rate of flow was taken as the indication of normal or increased pressure. Of the 22 cases bacteriologically positive, in 6 no record was made of the fluid pressure; in 4 it was recorded as normal; in 5 as increased; and in 7 as much increased.

Cases 6, 2, and 22 showed marked increase of pressure on the sixth, eighth, and eleventh days respectively, whereas Cases 9, 15, and 17 had a normal rate of flow on the thirteenth, fourteenth, and fifteenth days respectively. Total chlorides were estimated in two cases only: Case 28 had 0·605 per cent., and Case 29 had 0·620 per cent.; these were also the only cases in which the sugar content of the fluid was estimated, the results being 0·011 per cent. and nil.

POST-MORTEM FINDINGS

A post-mortem examination was made in 10 of the cases; all showed naked-eye evidence of tuberculous meningitis. Other tuberculous lesions were as follows: in the lungs in 6 cases, one of these being "healed"; in the spleen and kidneys in 3 cases; in each of the following sites in one instance: ileum, peritoneum, glands, brain, liver, Fallopian tubes.

Case 19 was the only example of generalised miliary tuberculosis. Case 11 showed a large mass in the left frontal lobe, over which the meninges were adherent; histological examination proved the mass to be a tuberculoma; in no other case was any cerebral lesion discovered which could have been the starting point of meningitis.

DISCUSSION

Adults rarely emit the cry of pain so frequently heard in children; instead they complain of the severe headache. They control their feelings better, and are not so irritable or fractious when handled. They rarely have convulsions or paralyses of the limbs. Retraction of the abdomen, diarrhœa, irregularity of the pulse, Cheyne-Stokes' respiration, and tâche cérébrale are less frequently present in adults. It is not rare to obtain a history of some trauma to the head in children. Schultze[3] records 11 cases from the literature in which symptoms followed within a few days or weeks of injury. From an analysis of 70 cases in children who were examined post-mortem, Paterson[4] found the average duration was twenty-one days. The present series gives the average duration in adults as fourteen and a half days; Warrington[1] found it to be between four and five weeks; Lawrason Brown[5] says it may be a few days only. Stewart[6] found cistern puncture in children as safe and easy as lumbar puncture, and much more likely to yield tubercle bacilli early in the disease. All Murray's[2] adult cases were submitted to lumbar puncture. None of the present series had cistern puncture.

Miliary tuberculosis is certainly more common in children than in adults. This review of the symptomatology in adults reveals the fact that at every stage of the disease there is great variability in signs and symptoms; this feature is emphasised by Lawrason Brown. The early symptoms are common to many conditions; those which clinically suggest meningitis, such as the ocular, cervical, and pyramidal groups, very rarely appear before the middle of the second week. For these reasons it is probable that the condition often passes undiagnosed, and that adults are affected more often than is commonly believed. The only certain method of diagnosis during life is the finding of tubercle bacilli in the spinal fluid. Other forms of meningitis depend for their exact diagnosis on the same method of examination.

Coincident lesions of known ætiology are not always present as a guide; in this series 18 out of 29 cases showed no other clinical focus of tuberculosis, though 8 of the 10 autopsies revealed other foci, 6 of them being in the lungs. Warrington[1] states that meningitis is chiefly a terminal event in chronic pulmonary tuberculosis, though only 1 of his 4 cases was known previously to have the lungs affected. Lawrason Brown[5] says that 8 per cent. of cases of tuberculosis end with meningitis, and that the meningeal lesion is usually secondary to tuberculosis elsewhere. In this connexion the work of Rich and McCordock [7] is of great interest. By careful slicing of the brain, they found that 38 out of 40 cases of tuberculous meningitis which they examined showed tubercles elsewhere in the brain, of which 36 were in direct contact with the meninges. They failed experimentally to produce meningitis by injecting tubercle bacilli into the blood stream, but easily caused it by injecting into the subarachnoid space. They conclude that visceral tuberculosis is first spread by the blood stream to the brain, and then the meninges become involved by direct spread from caseating tubercles.

Mental symptoms were present at some stage of the illness in 24 of 29 cases in this series, rarely during the first week, usually not until the tenth day. Warrington [1] records four proved cases in folk whose ages were between 26 and 38; three were males; all four cases showed an insidious onset over three to four weeks, with slight physical and mental depression, strangeness in manner, or hysteroid attacks; then there was a sudden change, with rapidly developing coma and death within a week. Lawrason Brown [5] states that in adults the onset may be marked by a change in disposition, slow cerebration, and some affection of speech.

The cerebro-spinal fluid usually gives evidence very suggestive of tuberculous infection apart from the presence of tubercle bacilli. This consists of the formation of a clot on standing, the presence of lymphocytes in relative excess, protein to the extent of 0·2 per cent., and diminution of chlorides to about 0·6 per cent. Murray's [2] 24 cases were aged from 15 to 60, the average age being 28; by prolonged search he found tubercle bacilli in every case in the lumbar fluid. His average findings were as follows: clear fluid, clotting, protein 0·27 per cent., chlorides 0·637 per cent., cells 298 per c.mm., mostly lymphocytes. Other workers have not had such a high percentage of positive findings of bacilli; 80 to 90 per cent. is mentioned as obtainable by special methods and careful search [8]; Stewart [6] found the bacilli in 24 of 42 cases by lumbar puncture within forty-eight hours of admission to hospital, whereas by cistern puncture he obtained 100 per cent. positive results on the same children within the same time; he concluded that the estimation of chlorides was of no diagnostic value.

Comparatively few attempts have been made to determine the relative incidence of human and bovine infection. Griffith [9] states that up to 1927, of 110 cases examined 21·8 per cent. were of bovine type. Combining two later series, one in which the cerebro-spinal fluid was cultured and one where post-mortem cultures were made, he found that 11 out of 14 adults showed human infection, and 95 of 126 children under 15 were infected with the human bacillus.

The mortality in the present series, and in Murray's 24 cases, was 100 per cent. Yet a study of published cases leaves no possible doubt that recovery may take place. Cramer and Bickel [10] review 46 cases of proved tuberculous meningitis from which the patients recovered; the bacilli were demonstrated either in the cerebro-spinal fluid or by animal inoculation, in some instances by both methods. Of these 46 patients, 30 per cent. were aged 20 years or more. They estimate that perhaps 25 per cent. died later of tuberculosis. Kramer and Stein [11] record one case of recovery from tuberculous and syphilitic meningitis (though the evidence for tuberculosis was weakened by a negative inoculation test, and the fact that the cerebro-spinal fluid was only positive for bacilli once in many tests), and review 73 cases of accepted recovery from proved tuberculous meningitis. Of these, 33 per cent. were aged 20 years or more, many remained well for three years, but relapses, or serious physical and mental sequelæ, were not uncommon.

One case (No. 7) in this series had a history of meningitis four years previously; no trace of this could be found at the post-mortem examination. Barber [12] records a case of recovery in a woman aged 37, who underwent operation twelve years previously for a tuberculous kidney; he remarks very significantly: "Had one supposed that the patient could get well, fuller clinical and pathological investigations would have been undertaken."

Pitfield's [13] case was a man of 50, who for ten years had suffered from pulmonary tuberculosis; he left hospital at his own request after three weeks, and was well two years later. Walker and O'Meara [14] describe the case of an army recruit who was admitted to hospital eleven days after being passed as medically fit; he presented signs of meningitis, and as there were sporadic cases of meningococcal infection at the time, he was given antimeningococcic serum intrathecally; the cerebro-spinal fluid contained 175 cells per c.mm., 95 per cent. being lymphocytes, and tubercle bacilli were found in the fluid. He was convalescent eight days after his admission. The father stated subsequently that for two months before enlisting his son had been irritable and had changed in his manner. The only method of treatment common to many of these cases of recovery has been frequent lumbar puncture.

SUMMARY

1. Twenty-nine cases of proved tuberculous meningitis in patients over 15 years of age are reviewed.

2. The sexes were equally represented; the average age was 26; the average duration of illness was fourteen and a half days; there was no instance of recovery.

3. All the classical signs and symptoms show great variation in prevalence, in intensity, and in the time of their appearance; many may be absent throughout the illness.

4. A clinical diagnosis of meningitis is rarely possible before the tenth day; an ætiological diagnosis is only possible by the finding of tubercle bacilli in the cerebro-spinal fluid, although tuberculosis is suggested by coagulum, lymphocytosis, increase of protein, and decrease of chlorides. The most useful clinical signs are those relative to the neck, the eyes, and the pyramidal track.

5. Recovery from tuberculous meningitis may occur, though this is very rare, and is often marked by serious sequelæ; the only certain help towards recovery is frequent lumbar puncture.

Twenty-four of the cases were seen in Withington Hospital; my thanks are due to the assistant medical officers for help with clinical notes, and to Dr. G. D. Dawson, pathologist to the hospital, for all the reports on the cerebro-spinal fluids.

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(References continued at foot of next page)

CANCER OF THE LARYNX

THE ANCHORAGE OF RADIUM IN ITS TREATMENT

By N. Asherson, M.B. Lond., F.R.C.S. Eng.

ASSISTANT SURGEON TO THE CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL; SURGEON FOR DISEASES OF THE EAR, NOSE AND THROAT TO THE QUEEN'S HOSPITAL FOR CHILDREN

For the insertion of radium needles in external operations for cancer of the larynx or pharynx the *hyoid cartilage, thyrohyoid membrane, and thyroid cartilage* are exposed. The necessary amount of cartilage is resected to expose the deep surface of the growth. A bed is thus formed for the reposition of the palisade of radium needles, each of which has a thread attached, and a radium content of 1 mg. per cm. of active length. The practical problem of retaining the needles in position and formation, for the prolonged period of radiation, is encountered at this stage.

The pharynx and larynx, with the cervical structures, are in a state of incessant motion, and cannot be put at absolute rest. Their movements tend to dislodge and scatter the needles all over the operative field. A radiogram taken some days after insertion of the radium will prove this point. Failure of the growth to react to radium, as well as some skin burns, may be due to this slipping of the radium without the attendant being aware of the fact.

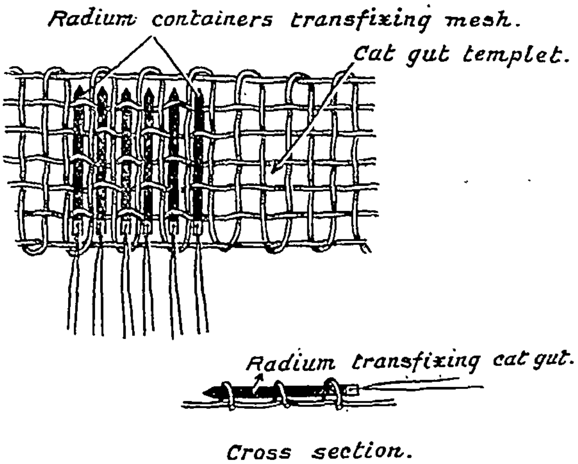
Radium containers transfixing mesh.
Cat gut templet.
Radium transfixing cat gut.
Cross section.

FIG. 1.—Catgut templet, loaded with threaded radium needles.

The devices in common usage for retaining the radium needles in situ include the following:—

1. Transfixion of the tissues adjacent to the growth with the radium needles. This carries with it the danger of penetration into the larynx or pharynx. The torpedo end is blunt, and does not aid the task of insertion.
2. Excising a window of cartilage corresponding exactly to the length of radium containers available, and retaining the latter in situ by tucking the ends between the inner surface of the cartilage and the deep surface of the growth. This is equivalent to making the exposure by fenestration according to the length of the needles available and not according to the size of the growth.
3. The radium needles may be sutured singly in situ *with catgut. This is a prolonged and tedious process*, and difficulties arise when the radium has to be withdrawn.

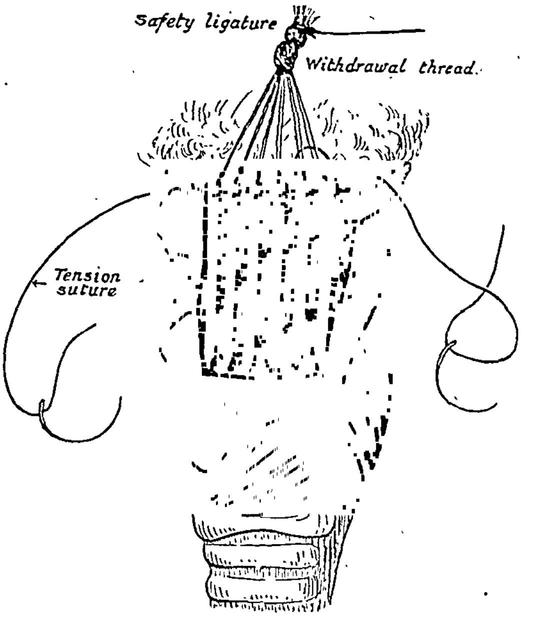

FIG. 2.—Cancer of epiglottis. To show anchorage of radium needles by the silkworm-gut stay suture.

To overcome the difficulty of fixation of the needles, I have found the following two devices of value: *(1) anchorage by means of a catgut templet;* (2) anchorage by means of a silkworm-gut tension suture.

ANCHORAGE BY MEANS OF A CATGUT TEMPLET

A loosely woven mesh of seven-day absorbable catgut was devised. The radium needles transfixed it, in a close palisade, in the way that pins are stacked in rows on paper. The ideal material for this purpose would be a strip of seven-day absorbable catgut, about an inch wide, with a double row of perforations to receive and lodge the radium needles. Such a strip is unobtainable, but at my request the Medical Supply Association, of Gray's Inn-road, wove a strip of catgut cloth, of coarse mesh, constructed with seven-day absorbable sterilised catgut. This strip is used as follows.

Before operation the sterilised threaded radium needles are fixed to the strip by transfixion (Fig. 1). The needles are stacked close together, in parallel palisade formation. When the bed for the radium needles has been exposed by resection of part of the hyoid and thyroid cartilages—e.g., for carcinoma of the epiglottis—a loaded strip is cut and trimmed corresponding to the size of the bed.

This catgut templet, usually containing six to eight threaded needles, is lowered into position, and the skin sutured over it. This keeps the radium in position. There is no difficulty in recovering the radium at the end of seven days, as the catgut mesh has disintegrated by then.

The mesh of the strip must be as fine as possible. The radium needles may be tied to the net with seven-day catgut, instead of attached by transfixion.

DR. HOLMES: *References*

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ANCHORAGE BY MEANS OF A SILKWORM-GUT TENSION SUTURE

The problem of preventing the displacement is solved if the needles can be retained indefinitely in situ by being strung upon and suspended from a fixed non-absorbable suture, after the fashion of clothes hung on a line. To achieve this purpose, a strong silkworm-gut is passed through the eyes of the threaded radium needles, which are drawn together snugly and parallel with one another. To each free end of the silkworm-gut is threaded a curved, cutting-edge needle. The serried palisade of radium needles is placed in the operative bed formed for it, in the depth of the wound, after resection of the cartilage. It is retained in position as follows.

The adjacent attached needle transfixes the tissues, from within outwards, at the upper, anterior, deepest part of the radium bed, taking up sufficient tissue to ensure a firm anchorage (Fig. 2). Care must be taken not to pierce any veins or blood-vessels, otherwise a troublesome hæmorrhage is precipitated.

The needle further transfixes all the tissues, emerging through the skin at some distance from the margin of the incision. An artery forceps is attached to the free end after detaching the needle. The other end of the silkworm-gut is similarly drawn through the upper posterior and deepest part of the radium bed, and then through the skin. An artery forceps is attached to it. The first point of entry of the needle on each side is such that traction simultaneously exerted on both ends of the silkworm-gut will draw the embedded silkworm-gut line taut, and so draw the radium needles into position firmly, accurately, and closely together, retaining them in situ. After the skin incision has been sutured subsequently, the free ends of the silkworm-gut are tied together firmly over it. It forms a tension suture and may be tied over a small pad of gauze to act as a dressing stay suture, obviating the use of a pressure bandage (Fig. 3).

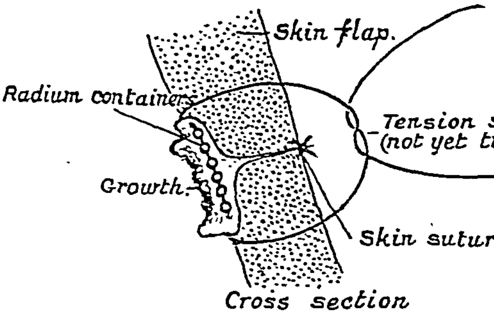

FIG. 3.—Cross-section of wound (diagrammatic) to show suspension and position of the needles.

When the time arrives for withdrawal of the radium, the silkworm suture must be severed on each side close to the point of emergence through the skin, which has been previously rendered sterile. This will prevent unnecessary infection entering the wound on withdrawal of the radium.

In a recent case of inoperable extrinsic carcinoma of the larynx, this method of anchorage was used with success. A radiogram taken on the seventh day after insertion revealed the radium needles in the same position as when first inserted, though the patient had been permitted absolute freedom of movement and was subject to bouts of coughing.

It has been my custom, when embedding radium, to twist all the attached double threads into one cable. This is knotted about three inches from the needles, and the redundant ends are cut short. The cable is coiled up in the depth of the wound at its lower part. The wound is then completely sutured. When the wound is reopened subsequently, after the skin stitches are removed, the edges are gently prised apart with dressing forceps and the cable is easily picked up. Even if only a single thread is located, traction on it will withdraw the entire bundle.

Extraction of the needles may be facilitated by previously tying a single withdrawal thread around the cable (Fig. 2) and allowing it to come through the lower end of the incision. Traction on this will deliver the cable and the needles.

The method of fixation of the radium needles by the stay non-absorbable suture is the method of choice, as it is rapidly performed and there is no occasion to excise a cartilage fenestra to fit the exact length of the radium needles available.

A CASE DEMONSTRATING THE VALUE OF GORDON'S TEST IN HODGKIN'S DISEASE

BY ROBERTSON F. OGILVIE, M.D., M.R.C.P. EDIN.
ASSISTANT IN THE PATHOLOGY DEPARTMENT OF THE UNIVERSITY OF EDINBURGH; ASSISTANT PATHOLOGIST, ROYAL INFIRMARY, EDINBURGH; AND

C. E. VAN ROOYEN, M.B. EDIN.
ASSISTANT IN THE BACTERIOLOGY DEPARTMENT OF THE UNIVERSITY

RENEWED interest has been aroused in Hodgkin's disease by Gordon's description[1,2] of a biological test which may be carried out with lymphadenomatous tissue obtained at either biopsy or autopsy. The value of this test is demonstrated by the following case in which the findings, even post mortem, still left the diagnosis in doubt.

CLINICAL HISTORY

A married woman, aged 24, with one child, took a "cold" in November, 1931, and developed a troublesome dry cough which was accompanied by pain over the sternum. Thereafter she noticed that she was losing weight, and complained of increasing weakness. Early in 1932 a swelling appeared in the right supraclavicular region. As she could not get rid of the cough she went to her doctor in February. He referred her to the Royal Infirmary, Edinburgh, for X ray examination, and in consequence of the findings at this examination she was admitted to the Infirmary on May 4th.

She had had several attacks of pain in the right iliac fossa during the past three years. In the family history there was nothing of interest.

Examination.—She was of medium stature, sparely nourished, and looking on the whole fairly healthy. Her temperature was 98° F.; her pulse-rate 74; and her respiration-rate 20. She had a cough, but no sputum or breathlessness; she had had some pain behind the sternum. The thorax was well formed; there was slight fullness on the right side at the root of the neck. In the posterior triangle on the right side some discrete, hard lumps about the size of walnuts were felt. They appeared to be continuous with a mass which disappeared behind the sternum. There were no more lumps on the left side. There was greater dullness than normal over the sternum, and this dullness was also present for 2 in. on each side of the median line in the first, second, and third interspaces. Over the rest of the chest the note was normal. Vesicular breathing was heard all over both lungs, and vocal resonance was not increased. Nothing unusual was noted in the circulatory system, except abnormal faintness of heart sounds in the aortic and pulmonary areas. The lymph glands were enlarged in the right posterior triangle of the neck, but not elsewhere. The alimentary, genito-urinary, and hæmopoietic systems showed nothing of note. The urine was normal, and the Wassermann reaction of the blood negative. Radioscopy showed in the upper anterior mediastinum a large shadow of even density and irregular outline. The trachea was centrally situated and not compressed.

Clinical Diagnosis and Treatment.—In view of the clinical and radiological evidence a diagnosis of sarcoma of the thymus gland was made, and a course of deep X ray therapy instituted. In consequence of this treatment the neoplastic mass underwent a rapid and pronounced diminution in size. The patient was discharged on May 21st and given instructions to attend the radiological department as an out-patient. Her general condition was then good.

State on Readmission.—She was readmitted on Feb. 22nd, 1933, with a history of increasing malaise, weakness, and dyspnœa, giddy turns, cough with little sputum, and loss of weight. Dullness was present below the clavicle to the second rib, and tranversely from an inch to the right of the midline to 3 in. to the left. Posteriorly there was a midline area of dullness about 4–5 in. broad. Over these regions vocal resonance and fremitus were greatly increased, and breathing was bronchial in type with no accompaniments. The supraclavicular glands were palpable on both sides, round and shotty, largest on the left. Post-cervical glands were also palpable. One gland in each axilla was enlarged to the size of a big walnut, but none were felt elsewhere. X ray examination now revealed definite enlargement of the mediastinal mass, together with diffuse opacity of the upper lobe of the left lung.

Termination of Illness.—While in hospital the patient developed a large bilateral pleural effusion. Repeated aspiration had no effect in reducing the amount of fluid, which showed numerous red blood corpuscles and lymphocytes with a fair number of endothelial cells and polymorphonuclears, but no organisms. She rapidly became weaker and more breathless, and died on June 3rd.

POST-MORTEM EXAMINATION AND DIAGNOSIS

Both pleural and the pericardial cavities contained large quantities of greenish serous fluid. In association with the parietal layer of the pericardial sac on the left side, there was, just above the diaphragm, a large mass of nodular, very firm, pale yellowish-white tissue. The peritoneum, larynx, and trachea were healthy.

The pleura of the left lung was smooth and glistening over the upper lobe, wrinkled over the lower lobe. The upper lobe was uncollapsed and more or less uniformly consolidated; the lower lobe was unduly collapsed. Section revealed that the consolidation of the upper lobe was due to extensive infiltration of the tissue by new growth, which seemed to have originated in the region of the hilum and spread peripherally. The margin of the infiltrated zone was irregular, but fairly well defined. The infiltrated area was greyish-yellow in colour, with here and there a congested hæmorrhagic patch. The surrounding lung was rusty-red in colour. The lower lobe was congested. The right pleura was unduly wrinkled, and the right lung collapsed, congested, and moderately œdematous.

A group of enlarged glands was present at the base of the neck on the left side. These glands were fairly discrete and very firm, and presented on section pale yellowish-white, more or less homogeneous surfaces; no necrosis or caseation was evident. A few enlarged glands were also present in the anterior mediastinum, and there was a chain along the vertebral column in the posterior mediastinum. Another large mass of glands was present along the lesser curvature of the stomach, and the para-aortic group of glands was markedly enlarged. The heart showed brown atrophy. The liver and spleen showed well-marked chronic venous congestion. The kidneys also showed chronic venous congestion.

The macroscopical findings necessitated a consideration of (1) Hodgkin's disease; (2) carcinoma of lung (bronchial or alveolar); and (3) mediastinal sarcoma. Points in favour of Hodgkin's disease were the age of the patient, the excellent response to irradiation, the widespread lymphatic involvement and the character of the glandular masses (discrete, non-necrotic, non-caseous). Points against this diagnosis were the invasion of the left lung, the presence of a large mass in association with the pericardial sac, and the absence of splenic and hepatic involvement. Bronchial carcinoma was favoured by the character of the growth invading the upper lobe of the left lung. The situation of this apparent neoplasm also suggested the possibility of a sarcoma of mediastinal origin.

BIOLOGICAL TEST

Although the weight of the evidence was in favour of Hodgkin's disease, it was impossible to be certain of this diagnosis without microscopical examination of the tissues. While ordinary paraffin sections were being prepared it was decided to employ and test the efficacy of the recently described Gordon biological test for Hodgkin's disease.

In order to avoid superficial contamination, enlarged lymphatic glands removed from both neck and abdomen were flamed in absolute alcohol and plunged into boiling water for two seconds. The superficial loose tissues were then clipped away, and the central portion prepared for emulsification. About 2 g. of tissue were then ground in 20 c.cm. of broth (pH 7·1) and a part of it used for the immediate inoculation of rabbits, whilst the remainder was stored at −4° C. in the refrigerator for later use.

Three rabbits were prepared for intracerebral inoculation, and approximately 0·35 c.cm. of the suspension was introduced into the occipital lobe of each animal to a depth of 3 mm., accompanied also by the administration of an intravenous dose of 0·5 c.cm. into the auricular marginal vein, conducted after the manner described by van Rooyen.[3]

The animals withstood the operation satisfactorily and were apparently in good health after 36 hours. At the end of 48 hours, however, all three rabbits showed slight signs of impaired locomotion. This was followed next day by spastic paralysis of the hind limbs and marked ataxia with incoördination on attempted movement. The last-named features were more readily demonstrable by the application of Gordon's Romberg test for rabbits.[1]

Tissue suspensions which had been allowed to stand at −4° C. in the refrigerator for varying periods of time up to three weeks were used for the inoculation of 12 additional rabbits. Eleven of these developed the characteristic syndrome described by Gordon[1] within three days. Four rabbits succumbed to the illness, three recovered completely, and four passed into a chronic condition characterised by muscular atrophy of the hind-quarters, loss of weight and hair, and incontinence of urine and fæces.

Bacteriological examination by aerobic and anaerobic methods of cultivation failed to reveal the presence of any organism in the brains of animals which had died from the condition. Media were kept under observation and remained sterile for four weeks.

The above results favoured the conclusion that the case from which the glands had been taken was one of Hodgkin's disease.

Microscopical examination of tissue from cervical and para-aortic lymph glands, pulmonary growth, and pericardial mass was carried out a week after the autopsy. The histological appearances were in all cases similar. The tissue consisted in the main of a mass of reticulo-endothelial cells of all sizes up to small giant-cells of the typical Hodgkin type. Among this heterogeneous mass of cells were scattered numerous lymphocytes. The background consisted of finely granular, eosinophilic, necrotic-looking material. Here and there fairly large areas of tissue had undergone complete necrosis. This was especially so in the case of the pulmonary growth. Occasionally evidence of slight fibrosis was apparent, but this was not at all an outstanding feature. The condition was histologically one of acute "malignant" Hodgkin's disease.

SUMMARY

The Gordon biological test was applied to a case in which the clinical and post-mortem naked-eye findings were not conclusive of Hodgkin's disease. The test gave a positive result in 48 hours and thus substantiated a diagnosis of lymphadenoma. This was corroborated a week later by microscopical examination of the tissues.

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THE TREATMENT OF CANCER WITH CONNECTIVE TISSUE EXTRACTS

By H. Searle Baker, M.R.C.S. Eng.

This paper describes a method of treatment which has given encouraging results in a few cases of inoperable cancer.

In 1928 I formulated a theory which I have since elaborated and for which support has been found in the recorded observations, both in fact and theory, of other workers. I am of opinion that the excessive growth of cells is controlled by substances secreted in the connective tissue of their area. It is not an unreasonable postulate that a factor exists to inhibit the tendency of living cells to reproduce themselves indefinitely, and my work is based on the view that this factor is a substance secreted locally outside the blood stream and discharged into the lymph. If a cell, or group of cells, be deprived of adequate inhibition—e.g., by lymph stasis or actual failure of secretion—it will reassert its fundamental tendency towards unlimited growth.

Further to, but not essential to, this hypothesis are the following views. It is not impossible that the inhibitory factor be an enzyme, and for various reasons it is considered that its major function is lipolytic. It is secreted in the connective tissues and functions to the best advantage in the area of its secretion. In normal healthy persons it is destroyed in the lymphatic glands, and eventually, if it escapes this, in the blood stream.

Treatment is designed to introduce this essential substance into the carcinoma by the intravenous administration of an extract of connective tissue derived from an area, in the pig or cow, corresponding to that of the primary growth in the patient. In my experience the result of this treatment has been that the patient loses his cachetic appearance and the carcinoma diminishes in size and becomes attenuated in vigour. This suggests that by repeated courses of treatment at lengthening intervals the carcinoma may be deprived of its power to destroy life. Assuming that the inhibitory factor has been introduced in the blood stream in sufficient quantity and is circulating, it is manifest that it will attack the overgrowth of cells, at any rate cells from its own area, wherever it may meet them. That is to say, its action can be expected to, and in fact does, apply to metastases as well as to the primary growth.

The following is a chronological account of my endeavours to apply my theory to treatment. Cases 1 and 2 were undertaken before the theory which has been outlined was fully matured.

CASES TREATED

Case 1—(1929).—Female, aged 64. Treated in Royal Northern Hospital by courtesy of Dr. C. C. Beatty. Laparotomy had been performed at Middlesex Hospital, and a diagnosis of inoperable carcinoma of the ovary had been made. There was considerable ascites and the abdominal wound was well healed. Paracentesis abdominis was performed daily under local anæsthesia, and the fluid obtained was reinjected intravenously in doses increasing up to 30 c.cm., in an attempt to ascertain whether or no it contained any factor inhibiting the ovarian growth. The patient put on 14 lb. in one month, but the growth of the carcinoma appeared to be accelerated. It was considered probable that the ascitic fluid had a high content of anti-inhibitory substances.

Case 2—(1930).—Male, aged 56, with a large, ulcerating, superficial carcinoma of the chest wall. A solution of muscle extract was given intravenously, and with doses of 15 c.cm. daily it was found that the growth could be controlled. The ulcerating edge ceased to show the characteristics of malignancy and the growth ceased to extend. But the malignant appearance reasserted itself when treatment was withdrawn for a period so short as two days, so that no permanent benefit could be expected. The phenomena noted were regarded as being due to an endosmosis from the tissue fluids into the blood stream and into the growth. Treatment was stopped so soon as the very temporary nature of benefit was established.

Case 3—(1931).—Female, aged 56. The left breast had been removed in 1930 for carcinoma, and there was now recurrence in the left axilla with carcinomatous nodules in the skin; clinically there were also deposits in the lungs and liver. A solution was made of an extract of connective tissue from the breast of a sow. This solution was in normal saline and unbuffered. A preliminary intravenous injection was made of 1 c.cm., and subsequent doses were increased in order to overcome the postulated capacity of the blood to resist the inhibitory factor. The superficial deposits blanched on treatment; their surface umbilicated and their area diminished. They were ringed round at the beginning of treatment so that shrinkage could be confirmed. The lungs exhibited the clinical phases of regressing pneumonia and the liver became impalpable. She had numerous lipomata on her arms and these vanished. Pain, a prominent symptom, was relieved. Eight weeks after the first course of treatment the superficial deposits showed renewed activity. A further supply of the extract was obtained and treatment was renewed. Once more the superficial deposits blanched and shrank, and the patient had pulmonary symptoms. She then appeared to be free from active carcinoma until her death four months later—nor did her death appear to be due to an extension of the carcinoma. The activity of the extract appeared to be beyond question, but its "keeping" power was very small.

Case 4—(1931).—Male, aged 64. Carcinoma of the floor of the mouth with secondary deposits in the cervical glands. A local excision with diathermy had been performed and radium had been used without success. An extract was made from the connective tissue of the floor of hogs' mouths, prepared as in Case 3. This was injected intravenously in doses up to 15 c.cm. The primary growth became smaller and its surface cleaned. A central papillomatous outgrowth detached itself and fell out. The fœtor of the breath vanished and the cervical glands became more mobile. The very considerable pain was relieved, and the disease became inactive. When the growth became active again a further supply of extract was obtained but this precipitated within 24 hours. The supernatant fluid was injected but there was a considerable constitutional reaction, and the patient refused further treatment. He quietly went downhill and died of his carcinoma.

Case 5—(1931).—Female, aged 66. This case, by the kindness of Mr. Arthur Evans, was treated in Westminster Hospital. There were numerous carcinomatous nodules in the skin, recurrent after amputation of breast. An extract was obtained of connective tissue of sow's breast. This, on the advice of Sir F. G. Hopkins, was buffered with sodium phosphate and its keeping quality was thereby improved. The solution was injected intravenously each day, doses increasing from 1 to 20 c.cm. Almost exactly one hour after injection the patient had a rigor, but half an hour after that she was quite fit again and ate her midday meal with appetite. A nodule was excised before treatment and another after a course of treatment lasting a fortnight. Microscopical sections showed a very marked diminution in carcinoma qua carcinoma with considerable fibrosis.

(1932.)—About four months after her last course of treatment the carcinoma was again active. Criticism had been offered that the sections from the first course of treatment had been taken from separate nodules. The patient was readmitted to Westminster Hospital and a further supply of extract of connective tissue of sow's breast was obtained. This time the pressure employed at filtration was removed and the extract was stored in nitrogen. Half a nodule was excised before treatment and the remainder after treatment. The wounds healed by first intention. Sections showed the diminution in carcinoma previously noted, without the fibrosis. It may be that this was due to the alteration in filtration pressure in preparation of the extract.

In 1932 some published observations of the late Dr. J. D. Shaw Mackenzie led me to seek an interview with him. I found that, although there were differences in our point of view, he was satisfied by experiment that he had prepared a lipase from connective tissue. Accepting his statement on this point it was decided that future treatment would be conducted with a solution ultimately containing 10 per cent. of glycerin, and that the pH of the extract should be adjusted to 7·5 and carefully maintained there at every stage of preparation of the extract.

In June the public health committee of a county council, through the good offices of the medical officer of health, accorded me permission to pursue my work at a public assistance hospital, subject to supervision by the medical superintendent and the consulting physician to the hospital. Cases 6 to 11 were treated at this hospital and it was stipulated that Cases 6 to 9 should be on a pure protein diet.

Case 6—(1932).—Male, aged 58. Inoperable carcinoma of larynx. An extract was prepared from the connective tissue of larynx from several hogs. A total of 50 c.cm. was injected in eight doses, intravenously, in eight days. The patient was very definite about the relief of his symptoms, saying: "I can go to bed now and not be afraid of stifling in the night." No more laryngeal extract was available. During the six weeks after treatment the effect wore off and intravenous injections were resumed—but this time of connective tissue from sow's breast. This produced no benefit. Later, as a placebo, intramuscular injections were given of extract of uterine connective tissue. This was without apparent benefit, apart from its action as a placebo.

Case 7—(1932).—Male, aged 62. Inoperable carcinoma of tonsils and pharynx. An extract was prepared of hog's tonsillar and pharyngeal connective tissue. Fifty cubic centimetres were injected as in Case 6. The pharynx and tonsils had been covered with a carcinomatous ulcer, foul and sloughing. During treatment this condition cleared up in a very satisfactory manner—its area diminished and the edges of the ulcer lost their malignant appearance. Unfortunately no more pharyngeal extract was available.

For Cases 8 and 9 ten variations were made in the method of preparation of the extract.

Case 8—(1932).—Female, aged 51. Inoperable carcinoma of right breast, with a large area of ulceration in right axilla, very marked œdema of right arm and hand. Extract No. 5 was first employed and 50 c.cm. was given intravenously. This extract was a variant from the earlier preparations in that it contained 0·1 per cent. sodium taurocholate and 0·1 per cent. sodium glycocholate, with a view to preventing a theoretical absorption of enzyme to the surface of the preparation. Its basis was connective tissues of sow's breast. A note was made that No. 5 extract was clinically more active than No. 1 (see Case 9). When one bottle (50 c.cm.) had been used, treatment was continued with No. 10. Up to that point the improvement in the patient had been marked. The ulcerated area looked much better and was about half covered with epithelium. There was also marked improvement in the patient's sense of well-being—possibly psychological. Now for various reasons No. 10 was made from sow's breast, less connective tissue and without bile salts. The patient was tolerating high doses and 20 c.cm. was given of this preparation. Within four days it was clinically manifest that this preparation was definitely anti-inhibitory. The improved general condition relapsed and there were retrograde signs in the ulcerated area. It was decided to scrap No. 10 and continue treatment with No. 2. The variant of this preparation was that the connective tissue was subjected to the action of pure glycerin whilst the tissue was being ground with fine sand. This appeared to control the growth but it did not produce improvement. No. 4 was subsequently employed—this was an extract of whole sow breast. This appeared to exercise some degree of control and was followed by No. 6, which was No. 4 plus bile salts 0·2 per cent. But no preparation produced a marked effect subsequent to the injection of No. 10.

No more No. 5 was available or it would have been used again. There was no question as to its efficiency.

Case 9—(1932).—Female, aged 66. Inoperable carcinoma of right breast. Secondary deposits in humerus and ulna, and in liver also. An ulcerating area of growth in axilla approximately 8″ by 4½″. Massive œdema of right arm and hand. In this case treatment was begun with solution No. 1 of connective tissue extract of sow's breast. This was a solution containing 10 per cent. glycerin, 0·5 per cent. sodium phosphate, and 0·5 per cent. phenol. The first injection was given on June 8th and the last dose of this preparation on the 14th. During this time a slow but steady improvement in the case of ulceration—it diminished in size and showed approximately half the area covered by epithelium. But the general condition was very grave, and on June 16th a note was made that the patient appeared moribund. If she had died it is by no means certain that the end would have been accelerated by treatment. Despite her condition treatment was pursued, but the extract used was No. 6. This was No. 4 solution (vide Case 8) plus 0·2 per cent. bile salts. From June 16th she began a steady improvement. Intramuscular injection was performed on two consecutive occasions but it did not produce the clinical improvement that was shown on intravenous injection. On August 26th she was still improving with extract No. 6, so it was decided to try the effect of substituting cow for sow as the source of the connective tissue. It was not clear that this improved the function of the extract. Treatment was continued up to December, 1932, with extract No. 5, when unfortunately it had to be abandoned. The ulcerated area of growth which in June had extended over 36 sq. inches then occupied about 3 sq. inches, which was firmly healed except for two small areas of about the total size of a sixpenny piece. The liver was impalpable. The œdema of the arm was slowly diminishing, and the severe pain of which she had complained was very much better. It was considered that the optimum effect was secured by extract No. 5. When last seen in June, 1933, this patient was fairly well. The ulcerated area still occupied 3 sq. inches, but its surface was very foul and discharging. There was a considerable new deposit of carcinoma around the ulceration and in the skin. It was considered that, although no further course of treatment has been possible, her life was prolonged in relative comfort for at least one year. I am informed that she is still alive.

Case 10—(1932).—Female, aged 46. Inoperable carcinoma of ovary. Diagnosis made after laparotomy. An extract of Fallopian and ovarian connective tissue was prepared as No. 5 (see Case 8). The extract was employed by the intravenous route, and after 84 c.cm. had been given in three weeks it was judged that the patient was fit to return home. The uterus was then definitely more mobile than on admission and a tumour in the pouch of Douglas was considerably diminished in size. But on the morning when she was about to be discharged she had a sudden and severe collapse and drop in her blood pressure, accompanied by vomiting. This was approximately 20 hours after her last injection. She responded to adrenaline but had a parallel attack in about two hours. This was controlled by adrenaline, but a further attack, 36 hours after her last treatment, proved fatal before adrenaline could be used. This interval of 36 hours considerably obscured the immediate cause of death.

CASE 11—(1932).—Female, aged 59. Carcinoma uteri recurrent after hysterectomy. An extract was made of connective tissue from sow's uterus plus 0·2 per cent. bile salts. Only 50 c.cm. was available. This was duly injected intravenously, and the patient's only symptom, a profuse vaginal discharge, cleared up completely.

CASE 12—(1932).—Male, aged 56. Treated by Dr. T. Owen of Grange Park. A melanotic carcinoma primary in the eye, which had been excised, with large metastasis in the liver, which had been rapidly enlarging. An extract was made in this case from pig's retina and duly injected. It was reported that the metastasis had ceased to enlarge and was perhaps even contracting, but after the patient had received 100 c.cm. he was unable to afford further treatment.

CASE 13—(1932).—Male, aged 74. Treated by Dr. J. D. Whiteford of Walthamstow. An extract was made of connective tissue of pig's tongue and employed by the intramuscular route. It was reported that the ulcerating surface of the growth was speedily cleaned and the tongue became more mobile; but the patient, for no other reason than that he was obstreperous, refused to prosecute treatment.

These cases suggest that here is a treatment that will prove of definite value in carcinoma. There was no lack of response in any case to which it was applied, and one patient (Case 9) has survived in relative comfort for a year beyond her expectation. Moreover this was the only case in which there was adequate treatment up to a point.

SOURCE AND USE OF THE EXTRACTS

Preparation.—The extracts were prepared by Messrs. Research Products, Ltd., of Henrietta-street, London, W.C.2. Instructions were that the material used was to be removed immediately on the death of the animal and prepared straightway. It was not to be heated, kept on ice, or abnormally chilled, nor was it to be unduly shaken nor subject to any form of digestion. Its pH was to be kept constantly at 7·5 throughout preparation. The following is a description of the method employed in making extract No. 5 (breast):—

33 g. of connective tissue was obtained from 123 g. of sow breast. This was thoroughly ground, in 10 c.cm. of glycerin, with fine sand. 90 c.cm. of water was added and the whole was filtered at the maximum pressure consistent with effective sterilisation, through a Seitz filter. 0·5 per cent. phenol was added and the reaction adjusted. 0·5 per cent. sodium phosphate was added and the pH checked. 0·1 per cent. sodium taurocholate and 0·1 per cent. sodium glycocholate were added—the pH again adjusted, and the extract was boiled in nitrogen.

Activity of the extract as thus prepared is only retained for 10–14 days, when precipitation may occur.

Dosage.—The preliminary dose was in every case 1 c.cm. Subsequent doses were increased gradually with a view to overcoming a postulated increasing resistance of the blood to inhibition. The maximum dose employed was 25 c.cm. I think that the method of choice is without doubt the intravenous route, and the interval between doses to secure a proper clinical effect should not exceed four days.

Reaction.—The immediate result of injection is flushing of the skin in the neighbourhood of the needle. This is followed by flushing of the face, suffusion of the conjunctivæ, and discomfort—sometimes amounting to pain—in the tongue, within about 30 seconds. If large doses be given these symptoms are followed by a throbbing headache which may last for half an hour. Rigors occurred in one case. It is not considered that the death reported in Case 10 was directly related to treatment. No other unpleasant effects have been noted except in Case 3, where there was febrile disturbance accompanied by pulmonary symptoms—held to be due to the existence of metastases in the lung. Prolonged treatment may cause depression, but this is counterbalanced by the psychological value of the fact that some treatment is being undertaken and some result is achieved.

This brief paper is an account of the work I have done and the observations I have made. The reason for its publication is that I consider the results definitely promising, but I have no means and no prospect of prosecuting the research, and I am hoping that some other worker may be stimulated to follow up this line of inquiry.

AN ANAEROBIC GRAM-NEGATIVE BACILLUS AS A CAUSE OF PYÆMIA

BY A. W. FRANKLIN, M.B. CAMB., M.R.C.P. LOND.
CHIEF ASSISTANT, DEPARTMENT FOR THE DISEASES OF CHILDREN, ST. BARTHOLOMEW'S HOSPITAL

DURING the year 1932 an unusual gram-negative anaerobic bacillus was isolated in pure culture from the blood of two fatal cases of pyæmia. The cases presented many features in common: both were young girls with acute suppurative otitis media, in whom the infection seemed unusually severe in its effects on the general condition and on the temporal bone. Pus from the ears and the metastatic abscesses of both shared with cultures of the bacillus a characteristic fœtid odour. As a result of a study in the literature of the records of a few similar cases and of apparently related bacteria, the organism is regarded as a member of the group of anaerobic or microaerophilic bacilli of which *Fusiformis fusiformis* (*B. fusiformis*) is the type.

Though there are earlier descriptions of fusiform bacilli, notably that by Plaut[1] in 1894, Vincent (1896)[2] was the first to study *B. fusiformis*, which he found in the pus and in the tissues of cases of hospital gangrene. All his efforts to cultivate the organism failed, but he did produce a fœtid abscess containing the bacillus by inoculating pus, first in combination with a streptococcus into a healthy rabbit, and secondly alone into a rabbit in the late stage of tuberculous cachexia.

Veillon and Zuber (1898)[3] reported the first successful cultivation. Noting the disparity between the gram film of pus from fœtid abscesses and gangrenous tissues with its "purée microbienne," and the relative sterility of aerobic cultures, they determined to study such pus by making shake cultures and growing colonies in the depths of glucose agar tubes. Six different types of organism were isolated, including *B. fusiformis*, and the *B. ramosus* and *M. fœtidus* referred to below; later work has added to the number.

Veillon writing in 1920 of infections associated with gangrene claimed that true gangrene, a combination of inflammation, tissue death, and putrefaction, can only be caused by anaerobic organisms. Of these he recognised two groups. The first, now known as the fusiformis group, is delicate and non-sporing. Although the morphological characters, colonial appearances, and gram reactions vary, the members resemble each other in the fœtid odour of their cultures, their pleomorphism, their distaste for oxygen, and the difficulty with which they are grown. In spite of travelling in the blood stream to form metastatic abscesses, they rarely cause septicæmia, and are found in such conditions as noma, the anginas, fœtid otorrhœa, bronchiectasis, pulmonary abscess and gangrene, fœtid empyema, and gangrenous appendicitis. More than one type is usually grown from each case, in company with aerobic cocci and coliform bacilli.

The second and better known group contains the coarser, spore-forming, soil organisms, of which *B. welchii* is the type.

THE FUSIFORMIS GROUP AS PATHOGENIC AGENTS

Only *F. fusiformis*, found most commonly in Vincent's angina, has been seriously studied. In the most recent paper Varney (1927),[4] who gives a good historical survey, describes a serological classification of 18 strains into four types. The finding of *F. fusiformis* as the predominant organism in fœtid abscesses and pus is recorded by Peters (1911),[5] Dick (1913).[6] Dick and Emge (1914),[7] and Pilot and Pearlman (1923).[8] It has been described in sputum and as pathogenic in lungs and bronchi by D. T. Smith (1932),[9] who gives a summary of the literature. In none of these reports was *F. fusiformis* described alone, nor is it clear what part it played, whether that of prime cause or of secondary invader.

Vaucher and Woringer (1925),[10] in an article on bacteræmia and septicæmia due to anaerobes, state that they were able to find only a few observations of the presence of members of this (fusiformis) group in the blood stream. In 1912 Rosenow and Tunnicliff [11] reported a case of "pyæmia due to an anaerobic polymorphic bacillus, probably *B. fusiformis*." Varney's observations [4] make it probable that in this case the cultures were not pure, and that there may have been present *F. fusiformis*, a spirochæte, and an organism closely resembling the one to be described below. Larson and Barron (1913) [12] claim to have isolated *B. fusiformis* from the blood stream, but their report is not accepted by Varney. Boez and Keller (1924) [13] described a case of septicæmia in a woman of 28 years, following uterine infection, and due to an anaerobe with the characters of *Micrococcus fœtidus* of Veillon. Boez and Holtzmann [14] reported the case of a woman of 33 years, who died after a vague illness, characterised by fever, rigors, progressive weakness, and anæmia. No autopsy was allowed. Blood culture in solid media, a method insisted on for this work by many workers, grew an organism with the characters of *B. ramosus* of Veillon. In 1925 two cases of tonsillar sepsis followed by pyæmia due to an anaerobic gram-negative bacillus were reported by Hegler and Jacobsthal.[15] The organism found was said to resemble bacteriologically the one described by Buday (1916) [16] as responsible for an epidemic of pyæmia with liver and lung abscesses in 24 cases of suppurating gunshot wounds in two wards of a Budapest hospital. In 1927 Conway Davies [17] described a case of pyæmia due to an unidentified anaerobic bacillus ending in recovery.

The exact relation of the organism isolated in the cases hitherto reported to the organism found in the cases described below is impossible to determine. In no case has a complete bacteriological study been possible. The undoubted similarity of clinical and bacteriological features in some of these cases and in the two fresh ones here reported makes it reasonable to class them together—at least until further information concerning the fusiformis group becomes available.

TWO NEW CASES

A young woman, aged 18 years, was admitted to St. Bartholomew's Hospital under the care of Mr. Sydney Scott on Feb. 29th, 1932, on account of a painful, discharging right ear. Three weeks before admission she had had an attack of tonsillitis, with fever, sore-throat, and swollen cervical glands; two weeks before admission she had pain in the right ear, followed by discharge.

Diagnosis on admission was acute suppurative otitis media, though the patient appeared unusually ill and "toxic." An immediate right Schwartze was performed by Mr. Scott; fœtid pus was found in the mastoid cells under pressure; the lateral sinus and the middle fossa dura were exposed and appeared normal.

Course.—The general condition improved only slightly after operation, pus continued to discharge from the wound, and the temperature rose occasionally to 100° F. For these reasons, and because the tonsils appeared septic, after much deliberation tonsillectomy was performed by Mr. F. C. W. Capps on March 17th. After operation the temperature began to swing, reaching 104° F. 31st: examination by Dr. A. E. Gow showed no abnormal signs in heart or lungs. April 4th: an abscess in the right parietal region was opened by Mr. Scott, who found that the whole right parietal bone was infected up to but not crossing the limiting sutures, suggesting a metastatic rather than a direct spread of the infection. The infected bone was removed, the lateral sinus explored and obliterated.

Twelve days later an abscess over the frontal bone extending back to the occipital region and an extradural abscess were evacuated, with further extensive bone removal. Some temporary improvement followed blood transfusion, but by April 26th the temperature rose again, and on the 30th, with the onset of rigors, oliguria, and hæmaturia, a clinical diagnosis of septicæmia was made. Antistreptococcal serum was given intravenously. On May 6th there were signs of fluid in the left pleural cavity; on the 7th a skin abscess appeared in the region of the olecranon, followed by one in the region of the acromion. The patient's condition continued to deteriorate. On the 17th there was sudden pain in the chest and collapse. A chest skiagram showed evidence of a cavity at the apex of the right lung, probably an intrapulmonary abscess, with an effusion at the left base. Death occurred on the following day. Post-mortem examination was not allowed.

Pathological investigations.—March 11th: red blood-cells, 3,440,000 per c.mm.; white blood-cells, 16,800 per c.mm.; Hb., 50 per cent. 31st–April 1st: blood culture sterile after eight days. 3rd: mastoid pus-gram film shows a gram-negative cocco-bacillus in long chains (see Figure). Cultures on blood legumen-agar and serum slope, sterile. Thought to be a dead streptococcus. 15th: blood culture sterile. 18th: red blood-cells, 2,790,000 per c.mm.; white blood-cells, 18,800 per c.mm.; Hb., 42 per cent. May 2nd: blood cultures positive in all tubes after 48 hours. 7th: urine smoky; albumin +, red blood-cells ++, white blood-cells +, blood and epithelial casts +. Aerobic cultures on blood legumen-agar and litmus lactose agar plates sterile. 9th: blood cultures positive in all tubes after 48 hours, growth of gram-negative cocco-bacilli.

Blood cultures were made by inoculating four peptone broth tubes with one drop, five drops, ½ c.cm. and 1 c.cm. of blood, and incubating the tubes aerobically at 37° C. Attempts to subculture this gram-negative cocco-bacillus on to blood legumen agar plates aerobically failed. Re-examination of the mastoid pus showed the presence of organisms with the morphological characters of the gram-negative cocco-bacillus grown from the blood.

The second case was that of a schoolgirl, aged 5 years, admitted to St. Bartholomew's Hospital under the care of Mr. Sydney Scott on Oct. 11th, 1932, on account of a painful discharging right ear. Two weeks before admission she had had a cold in the head with right-sided earache; on this day a brother died at home after pneumonia. For four days the earache grew worse, and on day of admission there was headache, vomiting, and aural discharge. When admitted she was pale, ill, and delirious, with temperature 103·2° F., and pulse 140. There was slight stiffness of the neck; heart and lungs were natural. From the right ear came a copious, yellow, offensive discharge; the drum was perforated and the mastoid tender. The diagnosis on admission was acute suppurative otitis media.

Soon after admission a right Schwartze operation was performed by Mr. G. C. Knight, and generalised infection of lower and outer half of mastoid process was found. All the affected bone was removed and a drachm of fœtid pus evacuated from an extradural abscess around the lateral sinus. The sinus was not thrombosed.

Course.—Oct. 13th: patient fretful and delirious; copious offensive discharge from wound. Temperature 104° F. 14th: rigor, vomiting, photophobia. Signs of diffuse bronchitis. Albuminuria, hæmaturia. Lumbar puncture performed. Pressure of cerebro-spinal fluid, 240 mm. of water. Queckenstedt test showed lateral sinuses to be patent. X ray of chest shows clear lung fields. 7·5 c.cm. of antistreptococcal serum were given intravenously. The condition steadily deteriorated, temperature swinging from 99°–102° F., with a rising pulse-rate. 18th: respirations rose to 40 per minute. 20th: signs of consolidation of left upper lobe. 21st: transferred to children's ward under care of Dr. C. F. Harris. Temperature, 102° F. Pulse (sleeping), 140. Respiration, 48. Comatose, delirious, signs of consolidation have extended to the whole left chest. Hæmaturia. 22nd: discharging abscess in gum opposite first left upper molar; 5 c.cm. antistreptococcal serum given intravenously. 23rd: as a last resort, 130 c.cm. of paternal, citrated blood transfused. 26th: signs of fluid in left pleural cavity; patient considered too ill for exploration of chest. 27th: signs of left pneumothorax. Patient became more deeply comatose and died.

Pathological investigations.—Oct. 14th: white blood-cells, 17,400 per c.mm. Cerebro-spinal fluid contains 700 lymphocytes per c.mm. Cultures sterile. 21st and 26th: blood cultures positive. Growth in most heavily sown tubes in 48 hours and in all tubes in six days. 25th: pus from jaw abscess contains gram-negative bacilli with the morphological appearance of the blood culture bacillus. 27th: urine cloudy, albumin +, white blood-cells + +, red blood-cells +, hyaline, granular, and epithelial casts +. Gram film contains the blood culture organism, together with coliform bacilli and gram-positive bacilli of the vaginal type.

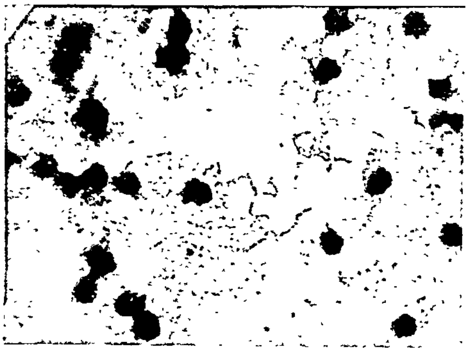
Abstract of autopsy report by Dr. E. R. Cullinan.—Right mastoid region is dry and clean; the remaining bone, meninges, and brain appear healthy. At level of first left upper molar is a small superficial gum abscess. There is a terminal pericarditis with slightly turbid effusion: right heart a little enlarged and hypertrophied. Right lung contains a few areas of collapse, emphysema, and broncho-pneumonia, with several small circumscribed abscesses in the lung substance, especially in lowest part of lowest lobe. Left pleural cavity contains gas and about 40 oz. of creamy pus, with a foul peculiar odour; the visceral pleura is yellow, firm, and a quarter of an inch thick in parts; no perforation could be found. Left lung is collapsed; there is some broncho-pneumonia and a few subpleural abscesses. At the base, and on the edge of the lower lobe, is an abscess three-quarters of an inch in diameter. Left hilum glands are infected, and there is some posterior mediastinitis. Peritoneum, stomach, and intestines are natural. Liver shows cloudy swelling and some fatty change. Spleen is somewhat enlarged, cut surface grey and slightly soft. Kidneys are pale, but otherwise natural, with no abscesses and no pyelitis. Bladder not infected. Suprarenals, pancreas, and genital organs are natural. Culture of heart's blood yields a pure growth of gram-negative bacilli. Spleen culture sterile. Pus from left pleural cavity; gram film shows mainly gram-negative bacilli, with a few gram-positive cocci in pairs, chains, and clumps.

THE CHARACTERS OF THE ORGANISM

The organism is a gram-negative, pleomorphic bacillus, occurring in films of pus in pairs and long chains, resembling in parts a gram-negative streptococcus, in others *B. influenzæ* (see Figure). In films of cultures longer and stouter bacillary forms are seen, but no fusiform bacilli, and no spirochætes. The length of single bacilli varies from 0·8 μ to 9·5 μ. They are non-motile and non-sporing.

Staining reactions.—Gram-negative; not acid-fast; no special characters with methylene-blue or carbol-thionin; no polar bodies with acetic acid-toluidine-blue.

Cultural characters.—Growth does not occur in the absence of blood or serum. Aerobic culture at 37° C. in blood-broth gives in 24 to 48 hours a uniform turbidity with a brown deposit and a characteristic fœtid odour. Serum broth remains clear with large flocculent deposits of growth. On solid media there is no aerobic growth. Incubated anaerobically in McIntosh and Fildes jar on blood legumen or serum agar, small, round, flat, transparent colonies appear after 48 hours, growing into raised, translucent colonies with granular surface and crenated edge, 2 mm. in diameter. Subcultures from solid media into blood broth grew neither aerobically nor anaerobically. There is α-hæmolysis; no ancillary phenomenon with colonies of staphylococcus aureus; no growth in gelatin at 20° C., nor in litmus milk.



The pleomorphic gram-negative bacillus occurring in films of pus in pairs and chains. (From the first case.)

Sugar reactions.—Using serum-enriched media incubated anaerobically at 37° C. there was profuse growth without formation of acid or gas after 12 days in lactose, glucose, saccharose, mannite, raffinose, maltose, inulin, salicin, and galactose.

Hæmolysis.—On blood plates the organism produced α-hæmolysis. A mannite serum broth culture incubated anaerobically at 37° C. for 12 days was centrifugalised. 1 c.cm. of the supernatant fluid failed to cause hæmolysis when incubated at 37° C. for three hours with an equal quantity of 5 per cent. washed human red blood corpuscles suspended in normal saline.

Agglutinations.—The occurrence of clumping in the control tubes prevented the study of agglutination reactions. Viability and heat resistance were not tested.

The isolation of the organism in pure culture from the blood of both patients during life and its presence in the pus from the skull in the first case, and in the pus from the gum abscess, the pleural cavity, and in the urine in the second, leaves no doubt that it was the causative agent in these cases.

CONCLUSIONS

A review of the literature and a study of the two cases here recorded makes it certain that members of the fusiformis group, either alone or in combination, can produce both local abscesses and general blood stream infection.

The organisms probably inhabit the mucous membranes of the healthy body, and, as a result of local injury or general lowering of resistance, invade the tissues to produce fœtid abscesses, which may lead to pyæmia. Little attention has been paid to these organisms in this country, and scanty knowledge together with the difficulty of culturing them, may account in part for the rarity with which their presence is recognised. It would be of undoubted value to study fœtid pus from gangrenous tissues by modern bacteriological methods, in order to identify the types of anaerobes present, their susceptibility to chemical agents (it must be remembered that *F. fusiformis* and Vincent's spirochætes are susceptible to arsenic), and their capacity for producing immune bodies, which might be of therapeutic service.

My thanks are due to Mr. Sydney Scott and Dr. Charles F. Harris for permission to publish the notes of these cases, and to Dr. L. P. Garrod for his invaluable advice and guidance in the bacteriological investigation.

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A SPECIFIC TREATMENT FOR TRICHOMONAD VAGINITIS

BY JAMES ROBERT GOODALL, O.B.E., M.D.
D.Sc. McGILL, F.C.O.G.

GYNÆCOLOGIST AND OBSTETRICIAN TO THE MONTREAL MATERNITY OF THE ROYAL VICTORIA HOSPITAL; CLINICAL PROFESSOR OF GYNÆCOLOGY AND OBSTETRICS IN MCGILL UNIVERSITY

IN September, 1931, I published a paper in the *Canadian Medical Journal* in which a new treatment for trichomonad vaginitis was outlined, with a record of results in 22 cases. The following is a summary of that paper.

THE INFECTION AND ITS TREATMENT

Trichomoniasis or trichomonad vaginitis is a disease caused by a flagellated plasmodial organism probably originating in the bowel, and *Trichomonas vaginalis* is considered to be the specific organism of this well-recognised clinical type of vaginitis. The disease is characterised by a profuse liquid purulent vaginal leucorrhœa, causing an associated diffuse vulvitis. The symptoms arising from the latter are an intense pruritus, intertrigo, and acute pain on urination, due to the contact of the acid urine with the inflamed mucosa of the vulva.

On introducing the bivalve speculum the walls of the vagina are injected and tender, and the vault is filled with a yellow or greyish-yellow, thin, purulent liquid containing bubbles of air. The vaginal walls and portio vaginalis frequently present the strawberry appearance due to papillitis.

The disease is not transmissible (so far as is known) to the husband. *It is most frequently mistaken for* gonorrhœa. It is acute and chronic. The acute cases are easily diagnosed clinically; microscopically, the diagnosis is readily confirmed by a hanging drop of pus and normal saline, or better still, by pressing a cover-slip down hard on a drop of pus. The organism is readily found by its motility and by the motion imparted to the pus cells in its immediate vicinity. It is impossible to demonstrate the organism during the douching treatment. Being a plasmodium, it readily succumbs in vitro to all the antiseptics, but, per contra, the disease produced is very tenacious as a vaginitis. The organisms disappear quickly after douching, but reappear a few days after cessation or after the subsequent menstruation.

The *treatment presented here* was prompted by the ineffectiveness and long duration of the generally accepted treatments. It consists in using an acid antiseptic in a medium which will slowly dissolve, thereby keeping the vagina in a constant bath of disinfectant. These two factors are obtained by using vaginal cones of 1 per cent. picric acid.[1] A cone should be inserted high up in the vault on retiring. A simple acid (lactic acid 1 drachm to the quart) douche should be used once daily, in the morning. After the first treatment with the cone, the whole vulva becomes stained a pale yellow, owing to the picric acid. The cone should be inserted blunt end first, so that the vaginal contractions tend to drive it to the vault. If inserted point first the same force tends to expel it from the vagina.

Ordinarily there is a strong tendency for the disease to recur immediately after the next or subsequent menstruation; a renewal of the cone treatment brings this recrudescence under control. Such a recurrence has taken place in only two of my cases, probably due to insufficient or improper coöperation. There is no contra-indication to continuing the *treatment during menstruation.*

So far I have treated 22 cases by this method—four of these during pregnancy; three in the puerperium. The results have been uniformly successful. The average course of treatment is from five to ten days, and owing to its great simplicity is not irksome. The pruritus usually disappears during the first three treatments and the pus is generally absent after the third or fourth day. Desquamation goes on for some time afterwards. By the tenth day the mucosa has taken on a healthy appearance.

The treatment may also be carried out with advantage during pregnancy, except perhaps during the last month of gestation. The distress from trichomonas infection during pregnancy is worse than at any other time. Should treatment begin just before menstruation the daily insertion of the cone may be continued throughout the period and for some days afterwards.

One of my patients had been previously hospitalised five times, one four times, and another twice for green soap lavage of the vagina and subsequent packing with gauze saturated with mercurochrome, iodine, and other hitherto approved forms of treatment with only temporary relief, followed by the discouraging reappearance of all the symptoms after the next menstruation. These cases subsequently responded quickly and, so far, permanently to a course of picric acid treatment.

FURTHER EXPERIENCE OF THE METHOD

Since the above results were published in September, 1931, *42 new cases have been under treatment.* In all of them the organisms were found, and the clinical diagnosis verified by the microscope. In *every case there was a rapid and permanent cure.*

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[1] As prepared by Wampole and Co., Montreal, Canada. Formula as follows: picric acid, gr. 1; formolid concentrated, grs. 10; sodium tetraborates, grs. 5; zinc borate, gr. ½; acetanilide, grs. 2; hydrastine, equal to tinct. hydrastis, 15 minims; boroglyceride with gelatin, grs. 100.

All the symptoms disappeared in from three to six days. There have not been any recurrences in any of the cases treated since September, 1931. Among these was one patient which had been treated for one year by green soap, vaginal antiseptic packings and insufflations, but was never completely free from symptoms for more than a few days at a time. She responded to treatment, of eight days' duration, with a complete cure. Another was under local treatment by a gynæcologist for nine months, and responded to the picric acid completely in six days. Another woman of a very nervous type who, owing to the intolerable pruritus, had not slept more than in snatches except when overcome by exhaustion, was able to sleep most of the first night of treatment and was completely free from symptoms after the third day. In only one of these cases has there been a failure. This one case was rendered much worse owing to her intolerance to picric acid. I have heard of two other such cases of idiosyncrasy to picric acid, in which the pruritus and urinary symptoms were greatly aggravated.

In two of the very acute cases in virgins, in which there were dozens of trichomonads in every microscopic field, each had developed signs of acute left side peritonitis when I first saw them. As there was no sign of venereal trouble, nor of tuberculosis, these cases were looked upon as trichomonad in origin, in which the organism had gained access to the peritoneal cavity probably through preternaturally patent Fallopian tubes. That unduly patent tubes do exist, with dire consequences, is being reported by me in another paper. In still another case, in which the urinary symptoms were very pronounced, the vesical condition did not improve perceptibly after cure of the vaginitis. The patient was then catheterised and the urine centrifuged, and in the sediment several typical organisms were found among the pus cells. Cystoscopic examination revealed a diffuse redness of the bladder and considerable œdematous reaction in the region of the trigone. Instillation of 1 per cent. picric acid into the bladder, with instructions to retain the same as long as possible, brought about a cure after five treatments.

It may be that other preparations of picric acid cones would be equally efficacious. When looking about for a suitable preparation of picric acid, in a slowly soluble medium, for this work, it so chanced that I fell upon the one quoted heretofore, and it is recommended merely because it has done the work so satisfactorily. It may be that the form of administration has a great deal to do with the efficacy of the treatment. It differs from a douche in permitting long contact. One of my colleagues aptly synopsised the matter by saying that the cone differed from a douche as a bath from a shower. The success of the treatment might be laid perhaps not wholly to the picric acid, but also to the long contact of the fluid that bathes the tissues overnight. Be that as it may, the results are so consistently uniform as to justify the statement that we are dealing with a specific, in combined action and administration.

TUNNY EXHIBITED FOR A HOSPITAL.—Two years ago a committee of ladies in the east ward of Scarborough began to raise a fund of £500 to endow a cot in Scarborough Hospital. By the middle of August £340 had been raised, when a sympathiser bought a tunny just caught some miles off the town and exhibited it for the benefit of the fund. More than 24,000 paid to see the original fish and a successor, and the net profit of £160 that resulted completed the required amount.

BRITISH MEDICAL ASSOCIATION

ANNUAL MEETING IN DUBLIN

SECTION OF PATHOLOGY AND BACTERIOLOGY

AT the final meeting of this section, with Prof. T. T. O'FARRELL, vice-president, in the chair, a discussion on

Renal Functional Disturbance

in acute and subacute nephritis was opened by Dr. J. SHAW DUNN (Glasgow). The most baffling problem in nephritis, he said, was œdema. In earlier times it was assumed that œdema was the result of ineffective excretion of fluid by the diseased kidneys. In recent years, however, this explanation had been questioned. The fundamental objection to the theory was the absence of œdema in complete anuria resulting from blockage of both ureters or accidental removal of a solitary kidney. In such cases, moreover, there was no evidence of an increase of body-weight, whereas in cases of œdema, weight increased as the fluid in the tissues increased, and decreased as the œdema disappeared with diuresis. Various pathological lesions had been described in cases of nephritis associated with œdema, in some of which tubular changes predominated; the excretion of water, however, was more likely to be a glomerular function. Five types of nephritis in which œdema was a common symptom might be recognised—namely, acute diffuse glomerulonephritis; subacute glomerulo-tubular nephritis; nephrosis; amyloid kidney; and the nephritis of pregnancy. These conditions differed in their pathology: in glomerulo-nephritis, for example, there was blockage of the lumina of the tuft capillaries by endothelial cells, whereas in amyloid disease and nephrosis there was no such blockage, and in the nephritis of pregnancy the blockage was intermediate in degree. In acute nephritis and nephritis of pregnancy, moreover, there was often no change in the tubular epithelium, whereas degeneration was marked in the other three. In all five conditions the lesion was diffuse, the tufts were permeable to protein, and the tubular tissue persisted in bulk though degenerative changes might be more or less in evidence.

According to Widal, œdema was due to retention by the diseased kidneys of common salt, fluid being retained to preserve isotonicity. If he had spoken of retention of physiological saline rather than common salt his argument would have been less open to attack. It had been objected that marked salt retention might occur in chronic interstitial nephritis without œdema resulting; and that in some nephritic œdemas, notably in nephrosis, the blood showed no increase of water or salt, but might be concentrated. Arguing from this, Volhard thought that œdema was due to injury by toxins of capillary walls throughout the body, with the result that water and salt escaped, leaving the blood more concentrated. It had been pointed out, however, that the capillaries could not well be more permeable than usual to water and salt while, at the same time, the low protein content of the œdema fluid indicated that they were less permeable than usual. In this connexion it was worth noting that samples of blood examined in nephritis associated with œdema were usually taken from a vein; venous blood, returning from the tissues, must have contributed a certain amount of water and salt to the œdema fluid, and therefore differed from the blood going to the kidneys for purposes of elimination. Kylin had found that, while œdema was increasing, the colloid osmotic pressure of arterial blood was lower than that of venous blood, but during resolution of œdema the reverse was the case, because the venous blood was diluted by fluid from the tissues. The low salt and water values in the venous blood of nephrotic cases were no fair indication, therefore, of the salt and water values in the arterial blood.

According to another theory, in œdema the plasma proteins were diminished owing to loss by albuminuria, and consequently the power of the blood proteins to hold fluid in the capillaries against the hydrostatic pressure which tended to drive it out was much lessened. But the amount of œdema did not always correspond to the decrease of plasma protein, and the resolution of œdema in nephrosis occurred without the previous rise in osmotic pressure in the blood which might be expected. It was also difficult to explain the œdema of acute glomerulo-nephritis and of nephrosis upon the secretion theory of kidney action. The filtration-reabsorption theory was more promising; according to this hypothesis, it might be supposed that owing to partial blockage the glomerular capillaries could no longer produce sufficient filtrate by working in relays, but all had to work continuously. The filtrate produced would be distributed to all the tubules, with the result that reabsorption would be increased.

Dr. W. CRAMER (London) said that the view was generally taken that fluids were retained in the tissues by osmotic pressure, but he thought that the force of imbibition probably played a part. He had been able to show during the past two years an unexpected relationship between inorganic salts and the normal functions of the kidney. Animals fed on a synthetic diet, properly balanced and containing a sufficient vitamin content, were found to develop nephritis if magnesium salts were omitted. The nephritis was progressive, finally leading to interstitial fibrosis. It was not possible to produce this effect by leaving calcium or sodium salts out of the diet, nor was it obtained when both calcium and magnesium salts were omitted. He suggested that the nephritis was due to a disturbance of the physiological balance between these two salts. Pathologically the nephritis began as a degeneration of the glomeruli followed by tubular changes which he thought were secondary to the complete or partial glomerular occlusion. He had not been able to produce œdema up to date. These observations demonstrated that nephritis could result from disturbance in the equilibrium of inorganic ions in the absence of a toxic substance, bacterial or otherwise. In practice it was possible that imbalance of these ions might expose the kidney to the danger of injury from toxins or other agents which normally would be harmless. From the preventive aspect it might be worth while supplying a diet rich in magnesium to patients suffering from diseases of which nephritis was a common sequel.

Prof. J. T. WIGHAM (Dublin) said that certain factors deserved consideration in formulating any theory of nephritis. First, there was the reserve power of the kidney; in arterio-sclerosis a large number of glomeruli might be obliterated without ill-effect on the patient. Secondly, the kidney was supplied by a double set of capillaries, either or both of which might be affected in nephritis. Thirdly, in his opinion the kidney changes in nephritis must be regarded as having a toxic origin; the kidney cleaned the blood and the glomerular tufts were exposed to injury by toxins in the circulation, as were capillaries in other parts of the body. He thought that the albumin in the urine in nephritis was not necessarily all derived from leakage through the glomerular tuft. It was probably derived in part from tissue debris in the injured tubules. Osmosis, he considered, was largely responsible for the escape of fluid from the blood through the tuft. Salts passed readily from fluids of greater concentration to fluid of less concentration—in other words, they followed the water. The mechanical effects of swelling of the epithelial cells had an influence on the passage of fluid through the renal tubules; in cases of oliguria, the filtering effect of the blood pressure was probably negatived by the blocking of the tubules. In view of the complexity of the problem it was impossible to put œdema down to one factor only; probably there was an interplay of several factors.

Dr. JOHN GRAY (Aberdeen) said that while, in acute and subacute nephritis, glomeruli, tubules, and vessels were all affected, the glomerular changes were probably the most important, especially if it was accepted that the glomeruli were filters, and that the filtrate was concentrated by reabsorption in the tubules. In acute and subacute nephritis the glomerular filters were partly choked and were less selective. Albuminuria in nephritis was too considerable to be accounted for by the cells and debris of the deposit, and leakage of protein from the blood stream was the only feasible explanation. Oliguria was probably caused by diminished filtration through the inflamed glomeruli. Increased capillary permeability might be a factor in acute and subacute nephritis. There was some reason to think that nephritis was due to an allergic effect on the glomerular capillaries, and if this was so capillaries throughout the body might suffer damage which was not obvious histologically. It was true that the protein content of œdema fluids of inflammatory origin was much higher than the protein content of nephritic œdema; but the urine itself, in nephritis, might not contain as much protein as inflammatory œdema fluid, and in any case the actual filtrate passing the inflamed glomeruli must have much lower protein content still. The œdema of the later stages of nephritis, he admitted, could not be explained plausibly on a theory of increased capillary permeability, and in these cases he favoured the theory that œdema was due to lowered plasma osmotic pressure. It was wise, he thought, to admit that we did not know the cause of raised blood pressure in nephritis. In neither nephritic hypertension nor uræmia was there any direct evidence for attributing the symptoms to retention of an unidentified substance by the kidneys. To say that the hypertension was compensatory was merely to disguise our ignorance.

Dr. F. H. SMIRK (London) said that the percentage of protein in the plasma was diminished in famine œdema owing to reduction in the protein of the diet, and the same state might be produced experimentally in animals by a process of plasma pharesis. In such cases, provided the percentage of protein in the plasma was sufficiently reduced, œdema would develop despite the fact that renal function was normal. This was of interest as an illustration of simple hypoproteinæmic non-renal œdema. Referring to the origin of the albumin in the urine in nephritis, he said that experiments on fish had shown that certain toxic substances would produce albuminuria in fish with renal glomeruli which failed to do so in certain aglomerular fish, although damage to tubules in the second class of fish was marked.

In replying, Prof. SHAW DUNN remarked that famine œdema did not occur unless there was salt in the diet.

Cerebral Tumours

Dr. W. E. CARNEGIE DICKSON (London) read a short paper, illustrated by lantern slides, on the variability and multiplicity of cerebral tumours. He would omit, he said, all discussion of gliomata. Twenty-three years ago he had published a case of tuberose sclerosis, in which, in addition to the cortical and ventricular nodules in the brain there was a rhabdomyoma of the heart; in this condition "dislocation" tumours were commonly found in the brain, kidney, heart, and skin, and, more rarely, the pancreas, duodenum, thyroid, and breast. Lindau's disease was another example of such a multiple tumour syndrome, there being often, in addition to the characteristic hæmangio-blastomatous cyst of the cerebellum, an angiomatosis of the retina and perhaps cavernous angioma of the liver and cystic disease of the kidneys and pancreas. Closely allied to tuberose sclerosis, he considered, was von Recklinghausen's disease or multiple neurofibromatosis. In a recent case which he had examined an extraordinary variety of tumours was present; not only were there large bilateral acoustic nerve tumours, but innumerable smaller tumours upon nearly all of the cranial nerves. In addition, there were about 50 meningiomata of various sizes, some of them projecting into the lumen of the sagittal sinus. The posterior nerve-roots and the cauda equina were covered with small tumours, and there were also numerous intramedullary tumours, some of them similar to those found on the nerve-roots, but others apparently fibrillary astrocytomas. The patient had had a subcutaneous neurofibroma removed from his shoulder at a previous date, but no other subcutaneous tumours were found post mortem; a single minute tumour was found on one of the sciatic nerves. In another curious case the patient, a woman of 42, had an 11 years' history suggesting a right motor cortical lesion. She died, following operation, from a localised meningitis due to rupture of an infected pituitary cyst, and was then found to have a cavernous angioma of the parietal lobe, associated with multiple tumours at the base of the skull, some of them containing cavernous vascular spaces. In the roof of the pharynx and the body of the sphenoid there was an extensive myxo-chondro-adenoma, apparently arising from mucous glands. The pituitary fossa showed developmental abnormalities.

Dr. T. B. DAVIE (Liverpool) discussed the criteria of malignancy in relation to gliomata. In other parts of the body than the brain, he said, the criteria of malignancy were: (1) progress to a fatal issue; (2) peripheral invasion of other tissues; (3) the occurrence of metastases; (4) a limited survival period; (5) the specific histological picture. In the case of cerebral tumour, invasion of neighbouring tissue did not necessarily indicate malignancy: a pathologically malignant tumour might be delimited, while a benign tumour, such as an astrocytoma, might be invasive. The occurrence of metastases depended chiefly on the opportunity for tumour cells to enter the cerebro-spinal fluid. The rate of growth of a cerebral tumour could not be judged accurately, since the survival period could only be estimated from the date of onset of symptoms. The course was further influenced by the position of the tumour in relation to vital centres, the development of hydrocephalus, the occurrence of hæmorrhage, or the results of operation. Cushny and Bailey, in their classification of gliomata, put medullo-epitheliomata at the head of the list because the average survival period of patients with these tumours was only eight months. Pathologically, however, these tumours were benign. They developed from cell rests of a primitive type, and the tumour cells were therefore primitive, but there was no evidence of true anaplasia or malignancy. These tumours arose in proximity with the ventricles and caused death by giving rise to hydrocephalus. Because of the short survival period students were apt to regard medullo-epitheliomata as malignant. Further investigation of the pathology of cerebral tumours was called for in order to draw a distinction between pathologically malignant growths and growths which were rapidly fatal clinically.

Dr. JOHN MCGRATH (Dublin) said that the pathologist was commonly asked by the surgeon to give a name to a piece of tumour removed at operation, and to offer an opinion on prognosis. Dr. Dickson had shown that a small portion of tumour was not enough to justify a diagnosis, because the structure of the tumour might vary so much in different parts; while Dr. Davie had emphasised the fact that pathological malignancy was not the most important factor in prognosis. Moreover, Dr. Dickson had impressed on the meeting the necessity for a complete post-mortem examination. On the whole these speakers had added considerably to the burden on the pathologist. He asked whether variability and multiplicity were frequent characteristics of cerebral tumours.

Mr. A. B. CLERY (Dublin) said he had seen one case of tuberose sclerosis in which an ependymoma was present, but was inclined to think the association of the two accidental. In a series of 75 cases he had found 60 per cent. of gliomata, and of these 65 per cent. were examples of spongioblastoma multiforme; 12 per cent. were tuberculomata. He recommended the practice of biopsy; a small portion of tumour was removed with the diathermy loop or an aspirating needle and examined microscopically at a side-table during operation. The surgeon could usually learn enough from this examination to decide his course of action, and he could return to the operating table within a very few minutes.

In replying, Dr. DICKSON said that tuberculomata had now become extremely rare in England.

SECTION OF PHARMACOLOGY AND THERAPEUTICS

Prof. R. J. ROWLETTE (Dublin) presided over this section, and there were two discussions. The first was on

Diuretics and their Uses

Prof. D. MURRAY LYON (Edinburgh), in opening, defined diuresis as an increased flow of urine, irrespective of the composition of the fluid or its source, and distinguished two types—endogenous and exogenous. The subject of water balance, he said, was by no means simple, for the intake included not only the fluid drunk and the water content of foods, but also water as a metabolic end-product, 100 g. of fat yielding 107 g. of water. Moreover, removal of water was effected by the skin and expired air to the amount of a litre daily, closely corresponding to the metabolic rate. Diet also was a complex factor, for apart from the fluid content of foods, carbohydrates favoured water storage, and fats released fluids from the system.

A difficulty in using diuretics was that their function in disease was not necessarily the same as it was in health. The effect of digitalis and squill, in causing increased urinary output and relief of cardiac dropsy, depended on favourable posture and rest in bed, and the result was hastened by a dry diet and limitation of salt. Strophanthus and the xanthine series were uncertain and less lasting in effect, and were liable to damage the kidneys. Urea in doses of 10 to 15 g. seemed to be safe in its action, giving rise to prompt and marked diuresis, but should be withheld if there was nitrogen retention. It had proved of value in both cardiac œdema and chronic nephritis, but caused nausea if given continuously. The salts most used for saline solutions were citrates and acetates of potassium and ammonium, generally given in combination. Though probably without effect in cardiac disease, they might have a beneficial action in nephritis, but this depended on circumstances. Their conversion to carbonates caused alkalinity of urine, and this change favoured the retention of fluid in the tissues; neutral salts, on the other hand, induced acidosis and encouraged the dissipation of fluid. Water as a diuretic was of most use in infections and local lesions of the urinary tract, and in large amount it helped to rid the system of sodium chloride; but in cases of œdema it was a safe diuretic only when the salt intake was limited. Of the mercurials, whilst calomel and Guy's mercurial pill in daily purgative doses held an old reputation for creating loss of fluid and so relieving the heart, the greatest success had of late been attained with organic preparations, such as novasurol and salyrgan. Both were described as efficient and reliable drugs issued as sterile fluids for intramuscular inoculation. Salyrgan had proved very useful in relief of cardiac œdema and was less likely to cause mercurialism than novasurol. Of the hormones, adrenaline and pituitrin were known to have diuretic properties, whilst thyroid was the most important, especially in chronic nephritis with œdema, but was contra-indicated in cases with circulatory failure. Intravenous gum saline had proved of apparent benefit, especially when followed by blood transfusion, in cases of œdema dependent on reduced plasma proteins.

In cardiac cases a dry diet was often helpful, whilst a salt-poor diet and a low protein intake were essential for the control of dropsy, although in the chronic stage a normal or high protein diet might be more beneficial. Decapsulation of the kidneys was of value in anuria or when the urinary output was very small.

Prof. L. ABRAHAMSON (Dublin) said that from 1785, when digitalis was first introduced by Withering, until recent years there was little advance in the diuretic treatment of cardiac dropsy. Up to 1920, diuretics of the purine group, such as theobromine and Theocin, had been chiefly relied on, but they were uncertain in their effects. In 1920, however, the therapeutics of œdema reached a surer footing with the discovery of the diuretic action of novasurol, first used in Germany in 1917 for syphilis. The less toxic compound salyrgan marked a further improvement in 1924. Its mode of action was still undecided, but it was said to liberate water and salt from the tissues and to cause depression of the cells of the renal tubules. In 10 per cent. aqueous solution, given intramuscularly or intravenously for cardiac œdema, salyrgan caused diuresis for 24 to 48 hours, with output of 90–200 oz. of urine in the first 24 hours. He had adopted the routine method of a first dose of 1 c.cm. given intravenously in the early morning, followed by 2 c.cm. every fourth or fifth day, accompanied by routine digitalisation, tapping of hydrothorax, restriction in the amount of fluids, and administration of ammonium chloride grs. 10 to 20 three times daily. He had used salyrgan for dyspnœa in severe heart failure for the past five years without experience of any toxic effect, and had found it an important means of saving life, when digitalis was no longer effective.

The treatment of renal œdema by the use of diuretics was more complex, because of the difficulty of classifying cases of nephritis. In pure nephrosis there was more likely response to the diuretic action of ammonium chloride and nitrate in doses of grs. 15 to 30 thrice daily. Owing to the tendency to acidosis, great caution was necessary in using these salts in cases with renal insufficiency, their diuretic action being enhanced by salyrgan, and they should be withheld in acute nephritis for fear they should precipitate uræmic convulsions. In subacute or chronic nephrosis, however, they could be given with impunity, ammonium nitrate for preference, because of its greater diuretic effect. The use of calcium salts, in doses of 12 to 18 g., had been advocated for the relief of massive œdema, calcium chloride being safer than the ammonium salt, though less effective and more likely to cause gastro-intestinal irritation. In acute nephritis with scanty urine or anuria, 10 oz. of 20 per cent. glucose solution given intravenously once or twice daily had been found of value.

Prof. Abrahamson concluded by pointing out that for 150 years mercury had been used in heart failure, and that in 1679 Thomas Willis had recommended salts of nitre.

Dr. F. H. SMIRK (London), in discussing the difference between the diuretic action of urea in health and in nephritis, described his experiments to ascertain the output of chlorides in the urine before and after a dose of 15 g. of urea given in 100 c.cm. of water. In normal subjects the chlorides rose to 0·8 per cent., but in nephritis cases the increase was less. Determinations also showed that after taking the urea the plasma chlorides in the normal subject were less than the urinary chlorides, whereas the converse was always seen in nephritis, the urea percentage rising as the chloride output fell. He put forward the hypothesis that in advanced nephritis the damaged cells of the tubules could not resist the diffusion of water, and the raised pressure of the tubular urine withdrew water from the blood by osmosis into the tubules, diffusion continuing until the pressure in the urine and blood was equal; thus he accounted for the polyuria of advanced nephritis and the inverse relationship between the percentage of chloride and urea in the urine.

The PRESIDENT said it was not yet known how mercury acted as a diuretic.—Dr. DOROTHY HARE (London) mentioned the diminished output of urine in cardiac œdema under the influence of massive doses of digitalis as an early indication of complete digitalisation, usually attributed to the drug's toxic action on the heart. She asked if it was possible to distinguish that effect from the action of the transitory vasoconstriction alluded to by Prof. Lyon.

Prof. MURRAY LYON said he did not regard the decreased volume of urine as due to the toxic effect of digitalis. In hydrothorax the removal of a few ounces of fluid might improve diuresis.

Anæsthetics from the Practical and Scientific Aspects

Mr. F. J. MORRIN (Dublin), in opening a discussion on anæsthetics, spoke of the use of basal narcotics and the importance of securing pre-operative amnesia. Of the drugs employed, he thought Avertin the most useful. He condemned the practice of employing a basal narcotic for a patient receiving a spinal anæsthetic, for the combination might reduce blood pressure excessively. In spinal anæsthesia his own experience had been almost confined to novocain and percaine: the former, in 5 per cent. solution and doses of 10 to 12 mg., had proved the most reliable for anæsthesia below the umbilicus; the latter, in 1 in 5000 solution, was preferable for high abdominal anæsthesia. The disadvantages of spinal injection were the difficulty of localising the level of anæsthesia, and the post-operative headache; the headache occurred mostly in anæmic patients, and was relieved by 15 to 20 per cent. saline solution given intravenously.

Dr. R. W. Shaw (Dublin) remarked on the lack of progress in the art of anæsthesia as compared with surgery, and the sole reliance until recent years on ether and chloroform. For basal anæsthesia he had had most experience with avertin, but the risk of its toxic effects had led to its displacement by Nembutal for long operations, and by Evipan for short ones. The evidence in favour of the newer barbiturates was overwhelming. For spinal anæsthesia he gave preference to percaine, preceded by induction of sleep with nembutal given by mouth. In the present state of anæsthetics, however, it must be admitted that ether preceded by nitrous oxide was the most applicable in the majority of cases. The use of the mask and drop-bottle had passed for ever.

Dr. A. R. Parsons (Dublin) spoke chiefly on the importance of using a pure anæsthetic, whether ether or chloroform. There was a simple method of ridding ether of poisonous products such as acids and unsaturated chemical compounds which were a real danger to the patient, and tests should be applied for them. For pre-anæsthesia, nembutal represented a great advance; after 1 c.cm. the patient passed within a few moments into quiet sleep, and subsequently only a small amount of ether was required for maintaining anæsthesia. It was also of proved value in dental extraction. At the same time a risk attached to the intravenous use of nembutal which called for both care and experience, though there was little if any risk in the absence of hepatic and renal disease. He regarded ether as the safest anæsthetic; chloroform, although scarcely dangerous to a child, might cause sudden cardiac failure in an adult. But why, he asked, was there now always more basal pneumonia? He attached great importance to the sterilisation of apparatus in contact with the patient's mouth, and as the ether bag was difficult to sterilise, he advocated the use of a paper bag; further he emphasised the necessity of attention to mouth antisepsis before a patient was anæsthetised.

Dr. Smirk spoke of the antidiuretic effects of anæsthetics and narcotics, and their reduction of the urinary output—a result assumed to be due to interference with the mechanism regulating water excretion by the kidneys. He had studied the effect of anæsthesia on the absorption of water from the gut in rats, and found that absorption was always delayed, whatever the anæsthetic used. His observations suggested that the depression of renal activity after anæsthesia was due to failure of absorption of the water supplied, which affected the partition of fluid between the blood and the tissues, and that anæsthetics might thus help to establish the state of surgical shock by increasing the concentration of hæmoglobin in the blood. It was not unlikely that the inhibitory effect of ether and chloroform upon diuresis applied to man as well as animals, and he thought the anæsthetist should consider the advisability of omitting morphia injection, and restricting anæsthesia to the use of nitrous oxide and oxygen, for operations in relief of urinary obstruction or in renal decapsulation, in order to minimise the retardation of the urinary flow.

Dr. G. H. Morison said that sodium evipan, which though a barbiturate was not a basal anæsthetic, had not been produced as an anæsthetic, but was a chance discovery in the course of work in Germany on hypnotics. The quantity of hypnotic excreted in the urine varied considerably, thus some 70 per cent. of veronal escaped unaltered; luminal with a more rapid effect showed 10 to 12 per cent. excreted unchanged, whilst only 2 to 2½ per cent. of evipan could be recovered in the urine. In doses of 0·25 g. this drug induced sleep in 10 to 20 minutes. The soluble sodium salt given intravenously in very small amount had much the same effect as nitrous oxide, with sleep lasting 10 minutes, and was therefore of value for short operations, such as the removal of teeth or nails.

Dr. H. Quinlan (Dublin) was convinced of the value of disinfecting Clover's inhaler, and of the need for antiseptic attention to the mouths of patients, in order to reduce the risk of pulmonary abscess. Introduction of the tube into the airway favoured the direct action of ether on the larynx and encouraged the aspiration of blood or material from the nasal passages into the lungs. The rate of elimination of anæsthetics was of importance in connexion with lung complications; and after-effects should be carefully watched to allow of the early diagnosis and localisation of such sequelæ as pleurisy and pulmonary abscess.

International Cancer Congress.—This congress will be held at Madrid from Oct. 25th–30th under the presidency of Dr. Sebastian Recasens, and both scientific and social aspects of the disease will be discussed. Dr. William Cramer and Dr. E. G. Annis will be among the English representatives, and Dr. J. A. Murray will speak on experimental cancer. The secretary-general of the congress, Don Julio Bejarano, may be addressed at the Facultad de Medicina-Decanato, Atocha, 104, Madrid.

Autumn Congresses and Courses in Paris.—The first congress for the study of the photographic and cinematographic documentation of the medical sciences will be held at the Musée Pédagogique de l'État, 29, rue d'Ulm, Paris, from Oct. 5th to 7th. Dr. Charles Claoué, 39, rue Scheffer, is acting as scientific secretary to the congress, and the organising secretary is Mr. Michel Servanne, 48, rue de Romainville.—The fifteenth annual meeting of the French Society of Orthopædics will take place on Oct. 13th and 14th at the faculty of medicine, under the presidency of Prof. Mathieu, of Paris, the main subjects for discussion being the open reduction of congenital dislocations of the hip (Prof. Mutel, of Nancy), and chronic arthritis of the vertebral column (Dr. André Richard, of Berck). The secretary-general of the congress is Prof. H. L. Rocher, 91, rue Judaique, Bordeaux.—Two post-graduate courses have been arranged for October. From Oct. 9th to 21st there will be a course on diseases of the heart and blood-vessels at l'Hôpital Broussais, 96, rue Didot, Paris, under the direction of Dr. Charles Laubry. The course will seek to deal with the important cardiac syndromes from a new aspect; further information may be had from Dr. Dany at the hospital. From Oct. 16th to 27th a course on diabetes mellitus will be held under the direction of Prof. F. Rathery at the Clinique Thérapeutique Médicale de la Pitié. The details are obtainable from the secretariat of the faculty of médicine, Paris.

REVIEWS AND NOTICES OF BOOKS

Atlas of Otology

Volume II. By ALBERT A. GRAY, M.D., F.R.S.E., formerly Lecturer on Diseases of the Ear, Glasgow University. Glasgow: Jackson Wylie and Co. 1933. Pp. 72. £6 6*s.*

THE first volume of this atlas appeared in 1924, and its successor has been eagerly expected. It contains 91 plates which are exquisite reproductions of specimens largely prepared by Dr. Gray himself, although several have been made from tissues fixed by the intra-vitam method by Mr. C. S. Hallpike of the Ferens Institute. All the photographs, except two by this worker, have been taken by Dr. Gray, and must represent many hours of laborious work. Some are stereoscopic pictures, fewer than in the first volume, and a small stereoscope is provided in a pocket in the binding. As they are all flat specimens, the stereoscopic method is not so helpful as it was in the former volume. The first 24 plates deal with normal anatomy, chiefly of the organ of Corti, and show what is probably the true shape and position of the tectorial membrane when not distorted in the process of fixation. The pathological specimens include further examples of otosclerosis, with the investigation of which Dr. Gray is closely identified, and cases of otitic meningitis, of acusticus tumour, of senile degeneration, and of congenital malformation. This is a unique presentation of specimens relating to the anatomy and pathology of the ear which of all regions of the body is the most difficult of study.

Treatment of Rheumatoid Arthritis and Sciatica

Second edition. By A. H. DOUTHWAITE, M.D., F.R.C.P. Lond., Assistant Physician, Guy's Hospital; Honorary Physician, All Saints' Hospital. London: H. K. Lewis and Co. 1933. Pp. 131. 6*s.*

IN its second edition this book has been extensively revised and brought up to date by inclusion of the results of recent research; amongst other subjects the question of the blood-sugar is discussed, and a chart given of the average blood-sugar curve in 32 arthritics. The importance of Oriel's proteose is considered, the author giving his opinion that if used intelligently the value of the injection of proteose is unquestionable. An addition of considerable importance to this edition is a consideration of sciatica, and it is most heartening to read in the preface to this edition that the most cogent argument in favour of the inclusion of this disease is the fact that its treatment is so often satisfactory. The use and importance of manipulative treatment is stressed particularly in the presence of stiffened and deformed joints, and also in treating sciatic neuralgia. Suitable cases for this form of treatment are described with details of methods to be used, while a strongly worded warning is given of the dangers of unskilful practice. Another form of treatment described and recommended for central sciatica is intrasacral injection of saline, which when combined with manipulation is said to give a high percentage of successes. This book can be commended to those who wish to give their patients treatment based on sound principles, as sound as can be formulated in our present stage of ignorance of the ætiology of this disease, and to enable them to regain a measure of their former health.

Leçons sur l'alimentation

By GIOVANNI LORENZINI, Professeur de Chimie biologique à la Faculté de Médecine de l'Université Royale de Milan. Paris: Masson et Cie. 1933. Pp. 324. Fr.36.

A BOOK on practical dietetics by an author who is primarily a biochemist is a novelty in the literature of the subject. It should at least ensure a scientific approach, an avoidance of fads, and an adequate consideration of the chemical and physiological basis of dietetics. This is certainly true of Prof. Lorenzini's book. In the first six chapters he deals fully and in the light of the latest researches with the metabolism of the different nutritive constituents of foods and with the factors which regulate the bodily exchanges including the vitamins. The chemical composition of foodstuffs is described succinctly but adequately in a single chapter, and the rest of the book is devoted to nutrition in health and disease. The author writes with clarity and concentrates on principles rather than on details, and although he appears to be quite familiar with the latest investigations the text is not overburdened with references to authorities. He founds his directions for the dietetic treatment of disease upon the chemical pathology of the particular affection and avoids going into minutiæ, nor does he supply the reader with the elaborate menus which are becoming a tiresome feature of many modern treatises on diet. The book may certainly be read with profit by every practitioner who is anxious to give rational advice about food to his patients, but it may still be doubted whether dietetics is as yet such an exact science as the author would have us believe. In his very last sentence he really sums up the truth of the matter: "Manger peu, mais de bonnes choses, est le fin du fin de l'hygiène alimentaire." It is a pity that the book is not provided with an index.

Pediatrics

Series 1932. The Practical Medicine Series of Year Books. Edited by ISAAC A. ABT, M.D., Professor of Pediatrics, Northwestern University Medical School. With the collaboration of ARTHUR F. ABT, M.D., Assistant in Pediatrics at the school. Chicago: Year Book Publishers, Inc. 1933. Pp. 564. $2.25.

THIS volume provides a very large number of abstracts of articles concerned with pædiatrics published during the year 1932. It is a commonplace that it is almost impossible for even the specialist nowadays to keep up with the literature of his own subject, and the pædiatrician particularly has to watch many fronts along which advance is being made. The editors have been successful in what must first have appeared an almost hopeless task, and have provided abstracts which mostly do more than just let the reader judge whether he wishes to read the original article or not. The editorial comments are in comparison somewhat disappointing. While it is difficult to generalise from such diverse subject matter as is here included, it would seem that amongst the most striking advances made during the past year have been those concerned with immunisation and specific therapy of the acute specific fevers, though in anterior poliomyelitis the results of serum treatment are difficult to assess and are certainly less impressive than was at first hoped. The book has a number of well-selected illustrations, and is brightened by a few secretarial lapses—as, for instance, where "M.B. Edin." is given as the co-author of a paper.

Surgical Pathology

Third edition. By WILLIAM BOYD, M.D., M.R.C.P. Edin., F.R.C.P. Lond., Dipl. Psych., F.R.S.C., Professor of Pathology, University of Manitoba; Pathologist to the Winnipeg General Hospital. London: W. B. Saunders Company. 1933. Pp. 866. 50*s*.

ALTHOUGH shorter by about 60 pages than its predecessor, this new edition is no less comprehensive. There has been considerable condensation without the sacrifice of any essentials. Some new material has in fact been added, including short sections on the metabolism of tumours and on many other subjects. The chapter on healing has been merged into that on inflammation, saving much space, whilst the whole chapter on the thyroid, along with many other sections, has been rewritten. Prof. Boyd discusses the confusing problems of thyroid diseases in a lucid and critical manner, and has succeeded in giving a clear picture of the present state of knowledge on the subject. Prof. Boyd has established his reputation as a vivid writer, not only in this work but also in the two other important pathological text-books which he has produced within the last two years. He is able to impart his enthusiasm to the reader, and to instil a feeling of confidence. To the student contemplating higher degrees in surgery this text-book is almost indispensable.

L'hérédo-syphilis

Clinique et Thérapeutique. By Dr. JEAN HUTINEL and Dr. ALICE LINOSSIER-ARDOIN. With a preface by Prof. V. HUTINEL. Paris: Gauthier-Villers et Cie. Pp. 302. Fr.35.

THIS volume is the eighth to appear of a series of monographs by French writers on pædiatrics and puericulture. It opens with an introductory chapter by Prof. V. Hutinel, who tells us that when he was Parrot's house physician in 1876 he spent many hours with that master in the post-mortem room and in their small laboratory, carefully examining the tissues and organs of syphilitic babies and children. Since that time he has devoted his life to the work and has written much upon the subject, the final outcome of his experience being a book entitled "Le Terrain Hérédo-Syphilitique," published in 1926. Herein, in addition to the direct manifestations of hereditary syphilis, he dealt with signs and symptoms which he regards as indirect results of syphilis—either interference with growth or dysfunction of glands of internal secretion.

An early chapter in the work now under review is devoted to a comparison between the French views on congenital syphilis and those of the German school, with the latter of which most authorities in other countries are in agreement. The authors state that in this monograph they have adopted the French conception of congenital syphilis, as it has been evolved from the researches of A. and Ed. Fournier, Parrot, Hutinel, and Marfan, yet avoiding the extreme view of Leredde and others, who maintain that a very large percentage of the population suffers from congenital syphilis. There is possibly more to be said for the moderate French view—that obscure ailments in children and even adults may be due indirectly or directly to a syphilitic taint—than is generally admitted in this country; for Nabarro has recently brought forward evidence to show that syphilis in three generations of a family is by no means rare, and that latent or obscure syphilis may be elicited if carefully looked for. This book gives a good description of the symptoms and diagnosis of congenital syphilis, and in the first part, devoted to the clinical study of the disease, the authors have had the collaboration of Dr. G. Patey, of Dr. A. Ceillier on mental troubles, of Dr. H. P. Chatellier on the oto-rhino-laryngological manifestations, and of Dr. H. Lagrange on eyes. One is astonished to find that one short page and a half, without any illustrations, suffices to dispose of the dental manifestations—the description of the "mulberry" or Moon's molars being particularly inadequate.

The second part of the book—the therapeutical study of the disease—is better than the first. It goes fully into the details of treatment of the various phases of the disease with the different drugs available. Among the many bismuth preparations referred to, bismuth oxychloride is not even mentioned, although this is probably the drug most extensively used in this country at the present time. The book is well printed, but some of the reproductions of the radiograms of the bones, showing various degrees of osteochondritis, are poor.

Colds and Hay Fever

By FRANK COKE, F.R.C.S. Minor Monograph Series. London: Baillière, Tindall and Cox. 1933. Pp. 148. 5*s*.

AFTER a description of the functions of the nose, Mr. Coke gives a full account of the many investigations into the causation of the common cold, leading up to and including those of Dochez, Shibley, and Mills, which go far to prove that the actual ætiological factor is an ultra-microscopic filtrable virus. In conformity with this view, he does not observe any benefit from anticatarrhal vaccines. Menthol, he finds, gives a sensation of clearness, but actually closes the nasal air-way. In the treatment of hay-fever he relies partly on desensitisation with pollen extracts, and partly on the injection of non-specific proteins. Horse serum is ruled out for this purpose as dangerous to many people, and Mr. Coke prefers to employ a vaccine of mixed coliform organisms. The chapter on the general management and treatment of hay-fever and allied conditions is good. The book ends with an account of chronic nasal catarrh, which is far too short to deal adequately with this intricate subject. There is a good index and a copious list of references to authorities.

Cytological Technique

By JOHN R. BAKER, M.A., D.Phil., Lecturer in Cytology in the University of Oxford. London: Methuen and Co., Ltd. 1933. Pp. 131. 3*s*. 6*d*.

MUCH valuable information is here presented in small compass. Dr. Baker explains lucidly and concisely the scientific principles involved in the fixation of cells, and the embedding, staining, and mounting of tissues. The part of the manual that deals with fixation is the fullest and most deserving of attention. Theory is blended with practical information and the text enlivened with brief biographical and botanical notes. The author evidently has a special feeling for the conifers. How many people know that the general use of formaldehyde as a fixative is the outcome of F. Blum's observation in 1893 of the effects of this substance on the skin of his fingers? All who are interested in cytological technique will be rewarded by going through this little book; for those who desire more detailed information a good list of references is supplied.

L'exploration fonctionnelle de la rate

By Ed. Benhamon, Médecin des Hôpitaux d'Alger.
Paris: Masson et Cie. 1933. Pp. 256. Fr.50.

THIS is a stimulating book. Dr. Benhamon has applied to the pathological spleen the methods elaborated by Barcroft and others for the study of its physiology. He claims that an analysis of reserve function by a combination of radiological and hæmatological methods is a valuable aid to diagnosis. In the normal person the injection of adrenaline intramuscularly is followed by a contraction of the spleen which can be demonstrated radiologically, and which leads to an outpouring of platelets and red cells into the peripheral blood. This, he believes, is accompanied by changes in the chemical constituents of the blood, especially cholesterol and bilirubin. There may also be a leucocytosis, but this is not constant and is probably dependent upon other factors as well as splenic contraction. On the basis of his observations he suggests that splenic disorders may be roughly divided into three groups: (1) those characterised by failure of the reserve function as shown by failure to contract; (2) those characterised by excessive hæmolysis in the spleen as shown by clinical and hæmatological signs of increased blood destruction; (3) those characterised by excessive destruction of platelets. In some conditions a complex disorder affecting two or more of the normal splenic functions may be present. Chronic splenic anæmias, he believes, may be divided into: (1) Banti's disease in which there is definite failure of the reserve function; (2) a hæmolytic type of anæmia associated with splenomegaly in which the reserve function is also disturbed; and (3) splenomegaly dependent upon thrombophlebitis of the splenic or portal veins in which the reserve function is unaffected. The anæmia in the latter he holds to be secondary to hæmorrhage and not due to excessive hæmolysis—splenectomy being therefore contra-indicated. While devoting considerable space to a discussion of the reserve function of the spleen, Dr. Benhamon does not neglect the more usual clinical means of diagnosis. The physical signs, typical history, hæmatological picture, and appropriate treatment are all discussed and correlated with his own experimental observations. The ultimate acceptance of much of his work may be doubtful, but the book is of importance if only because it demonstrates yet again the value of applying physiological methods to clinical material.

Acute and Chronic Otitis Media

A Roentgenological Study. By Gösta Runström; Med. Lic. Stockholm: Acta Radiologica. Supplementum XVII. 1933. Pp. 89. Swed. Cr. 20.

THERE is some difference of opinion on the value of radiography in the diagnosis of inflammatory conditions of the ear, and on the degree of help given by this method to the clinician in estimating the severity and extent of aural disease. But all are agreed that, to obtain any useful skiagrams, it is essential that the projections—that is, the relative position of the head and the beam of rays—must be carefully chosen and constantly obtainable by some reliable device, and that the technique of exposure and developing be well defined and carefully adhered to. Dr. Runström gives here a full description of the technique he employs; the volume contains 54 stereoscopic skiagrams contained in a pocket at the end of the book, and his work must go far to dispel the doubts of the otologist and to convince him that radiography can show details of disease within the temporal bone which are of clinical value. The plates are beautifully reproduced and are accompanied by full clinical histories of the cases portrayed. A stereoscope is not provided, and one should be used to get the full value of the pictures. This is a valuable piece of work, of interest alike to the otologist and to the radiologist.

British Journal of Children's Diseases

IN Vol. XXX. (July–September) Dr. R. E. Steen contributes a paper on Cœliac Disease in which he discusses its incidence, ætiology, symptomatology, and treatment, with records of two cases.—In a paper on Lichen Urticatus or Papular Urticaria, Dr. G. W. Bray gives notes of 200 cases in children aged from a few days to 12 years, of whom 94 were males and 106 females. The majority of the cases were confined to the warmer months of the year. The diseases with which papular urticaria is most frequently mistaken according to Bray are varicella, variola, scabies, Hebra's prurigo, insect bites, sweat rashes, lichen planus, papular eczema, and papular erythema multiforme. In most cases which he has investigated two factors appear to be involved—one dietary and the other thermal. The dietary factor he divides into two groups of foods, viz.: (1) the fats, especially bacon fats, vegetable oils and fats, and cod-liver oil; and (2) common foods, such as fish, eggs, potatoes, oats, and chocolate in a small number of cases. The importance of the thermal factor is shown by the lesions generally appearing only in the warmer months, when the child is warm in bed, after a hot bath or exercise, or as a sequel to feverish complaints. Treatment consists mainly in removal of fats from the diet and preventing the child from getting overheated. Internally hydrochloric acid and pepsin are beneficial. Locally naphthol ointment (1 per cent.) with a solution of coal-tar (℥ii) in calamine lotion (℥viii) should be applied.—Under the title of a Rare Primary Osseous Dystrophy, Dr. P. Ellman gives the report of a boy, aged 15 years, the son of parents who were first cousins, who after an attack of measles at the age of 4 years gradually developed gross generalised bodily deformities, associated with generalised bony decalcification, and a low blood calcium, blood phosphorus, and blood phosphatase. The condition appears to have been first described by Morquio in 1929, and since then by Meyer and Brennermann, and Barrett.—Mr. Macleod Yearsley records a Case of Deafness due to Rickets. The patient was a girl, aged 4½ years, who had become deaf from rickets when 12 months old. The tympanic membranes were normal in texture, inclination, and lustre, but both exhibited the characteristic "salmon reflex" associated with otosclerosis. No response could be obtained to tests by voice, bell, tuning-fork, or whistle, so that the child was completely deaf. This is the first case of deafness due to rickets that Yearsley has seen in 25 years' experience of over 4500 cases of educational deafness, nor has he found any reference to this association in the literature.—Dr. Hildred Rockett reports a Case of Hæmolytic Streptococcal Meningitis with Recovery. The patient was a boy, aged 2¼ years, who developed meningitis in the course of whooping-cough, complicated by broncho-pneumonia. On otological examination the tympanic membranes were normal. A profuse growth of hæmolytic streptococci was obtained from the turbid cerebrospinal fluid which was under slight pressure. Recovery followed intrathecal and intramuscular injection of scarlatinal antitoxin.—The issue contains authors' abstracts of the principal papers read at the recent International Pædiatric Congress. The abstracts from current literature are devoted to surgery.

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THE LANCET

LONDON: SATURDAY, SEPTEMBER 16, 1933

EXCEPTIONALLY GOOD HEALTH

Sir GEORGE NEWMAN's report on the State of the Public Health, which appears this week,[1] contains the statement in a conspicuous place that "the exceptionally good health of the English people continues to be maintained." He contrasts this "coldly accurate statement" with the conclusions of a recent study of English public health and housing since 1844, in which it is stated that "the stark reality is that in 1933, for the mass of the population, Britain is a hungry Britain, badly fed, clothed and housed." There is, Sir George says, no comparison between the two periods 1844 and 1932; there is but an impressive contrast. He takes the infant mortality-rate as the most available medical index of communal well-being and finds not an incidental or exceptional figure but the latest return in a descending scale covering a generation. "Consider," he says, "the dense aggregation of the population in the 118 'large towns,' most of them industrial; reflect upon the devastating effect of the slums, in which so many hundreds of thousands of people are obliged to exist; ponder upon the abounding and expanding facilities for contracting infection by close community of contact in overcrowded homes and tenements, in cinemas, in schools, in factories, at race-meetings, in dancing rooms, or on trains and omnibuses; above all weigh the heaviness of industrial unemployment and its social dislocation with the distress of body and mind which follow in its train, and then remember that in spite of the disadvantages to which large sections of the population are thus subjected, the country as a whole has for some years enjoyed a period of physical health unsurpassed in our history." How has it come about? Sir George asks, but can find no satisfactory answer since we are too near to the event to measure it. But whilst many men have become unemployed, many women have entered industry, and probably as many people are now in work as there were on the average in the years immediately before the war; and employment outside the home is evidently conducive to health. Then again, one quarter of the whole population has been rehoused in new or reconditioned homes since the war. It may indeed not be unreasonable to believe that in the maintenance of health the various public medical services may have had an auxiliary and beneficent effect, but Sir George himself attaches most importance to the fact that the English people are learning more of the art of living. Twenty-five years of school medical service have left their mark; the physical outlook of the English people is beginning to change; they have learnt the happiness and worth of health and sound nutrition, of exercises and of rest, of games, music and dancing, of arts and crafts, of a freer life in the open air.

The effect of prolonged economic depression and widespread unemployment upon the public health has been studied at the Ministry of Health from various aspects: by examining the general death-rates for the various parts of the country, by scrutinising the reports of the medical officers of health, by a health insurance inquiry when the medical officers of the Ministry were asked to report frankly and freely without mutual discussion their individual views on the existence and prevalence in their own districts of any excessive sickness, ill health, or physical impairment. From all these sources Sir George finds no medical evidence of any general increase in physical impairment, in sickness or in mortality, as the result of economic depression or unemployment. We cannot, he says, fully assess the social results of these factors. There is inevitably a great and undetermined mass of deprivation, hardship, social ill, and anxiety. The inquiry has only dealt with the obvious end-results, viz., sickness returns and deaths. The national health is a finely poised equilibrium and we must not be too readily assured of the future. Though the medical reports contain no signs of widespread physical degeneration, there is an undercurrent of forewarning of the possibility of risk of mental instability in the adult man and prolonged under-nourishment of women and children. The overstrained mind is as susceptible to disease as the overstrained or underfed body. But although unemployment itself seems to be an unmixed evil, it must not, he suggests, be forgotten that in innumerable instances the unemployed person has more fresh air, physical rest, and freedom from industrial risks and restrictions than when employed. Over and above this we have in this country the medical machinery available for meeting exceptional circumstances.

SALT ECONOMY AND SWEATING

WHEN our remote ancestors forsook the seas—in which they had existed in a state of diffusion equilibrium—for the land, they were enabled to survive only by taking with them a supply of their marine environment. This has persisted ever since, in the higher animals, in the form of the extracellular body fluids, which according to MACCALLUM[1] are probably identical in saline composition with the primæval seas from which they were originally derived. At any rate it is certain that the maintenance of an approximately constant concentration of salt in these fluids is one of the fundamental necessities of animal life. In starvation, for instance, the kidney ceases to excrete sodium chloride after the first few days, although the disintegration of the protoplasm and water of the cells continues until the fast is broken. In contrast with this highly efficient renal mechanism for the conservation of salt it is somewhat puzzling to find that the only other important channel through which salt can escape—namely, the skin—seems much less closely guarded. Ten years ago Moss[2] found that miners working in a hot moist atmosphere lost so much salt in perspiration that slaking the thirst with ordinary water often caused unpleasant symptoms of water intoxication, analogous to those which follow the forced ingestion of large quantities of water and due, apparently, to dilution of the extracellular fluids. When the miners were persuaded to drink saline solutions instead of water, these symptoms did not occur.

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[1] Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1932. H.M. Stationery Office. Pp. 266. 4s.

[1] MacCallum, A. B.: Jour. of Physiol., 1903, xxix., 213.

On the other hand, the fact that man can exist on quite small quantities of salt in climates in which sweating is inevitable suggest that some degree of acclimatisation must be possible, and some recent work by DILL and others[3] confirms this surmise. In a cool environment the amount of salt excreted in the urine should approximate to the salt intake and, provided that the body-weight is constant, any deficit of salt in the urine can be put down to loss in sweat. Applying this principle, these investigators measured the salt output in several normal subjects in cool surroundings, and then continued their observations in a temporary laboratory in the Nevada desert. Here the salt deficit in the urine was considerable during the first few days, but afterwards steadily diminished although the extrarenal loss of water, as estimated indirectly from comparison of fluid intake and urine output, remained high.

These observations which, it is to be hoped, will be confirmed by more direct methods, are of considerable interest. The nature of the defensive mechanism concerned is uncertain. It may be that the sweat glands adapt themselves to the new environment and secrete sweat containing less salt. Alternatively it is possible that the composition of the sweat remains unchanged, but a greater amount of water is lost through the respiratory tract, as occurs in overheated animals, such as the dog. But whatever the explanation, the inference remains that in a hot dry climate some mechanism comes into play to conserve the extrarenal loss of salt. And, translating theory into practice, it seems desirable, as DILL and his colleagues suggest, that during the first few days in a tropical climate the process of acclimatisation should be assisted by increasing the salt intake and limiting physical exertion to a minimum.

THE PERSONAL FACTOR IN TUBERCULOSIS

IT is many years since an august layman on being informed that tuberculosis was a preventable disease inquired: "Why then is it not prevented?" One answer to the question, which would certainly have been appreciated by its author, has been provided by a girl unhappily smitten with the disease.

> "Supposing that's where I got the bug
> If I again were young
> I'm sure I'd do the very same thing
> And take a chance on a lung."

The quatrain is worth committing to memory, not perhaps as a tribute to the poetic muse, but because the social reformer is apt to forget that disease cannot be brought under control unless its victims, whether prospective or actual, are also controlled. It is indeed much easier to eradicate tubercle bacilli than the expression of those instincts upon which the survival of the race depends. The relative indifference to the dangers which surround us is after all less unwholesome than the exaggerated concern to avoid all appearance of evil which many health reformers evince. It has been estimated, so Dr. MYERS tells us,[1] not without the suspicion of a smile, that the abolition of kissing would decrease the tuberculosis death-rate by 50 per cent. in a period of 10 to 20 years. It is equally true that the abolition of explosives would diminish the death-rate from gun-shot wounds to zero in a similar period. Unfortunately human inertia, ignorance, recklessness, and passion are still factors to be reckoned with when either a peace or a public health conference is convoked. But Dr. Myers is convinced that tuberculosis can be eradicated, and his interesting monograph, apparently intended in the main for lay reading, explains very clearly how this could be done, at any rate in a world completely recovered from trade depression, amenable to reason, and willing to submit to intradermal tuberculin tests and radiographic examinations whenever called upon to do so.

As tuberculosis affects both man and beast, both sources of infection must be dealt with. In many districts of America tuberculosis as a cattle plague has been almost abolished by a system of tuberculin tests and the slaughter of positive reactors. Dr. Myers would go further and place even household pets under veterinary supervision. The cat is not necessarily harmless in his eyes, for the cat has strolling propensities, and in her walks abroad may easily tread on ground contaminated by spittle, and returning home may be cuddled by the children with results which may completely belie the well-known nursery poem. The doctor may however be well content to leave animals to the veterinary officers who, as the author reminds us, are already well ahead of their medical colleagues in the control of tuberculosis. To prevent tuberculosis from spreading among human beings he would concentrate on three things. (1) Infection must precede disease. By means of the Mantoux test it is possible to separate the infected from the uninfected. All school-children must submit to intradermal tests and X ray examination must be made whenever a positive reaction proves that infection has already occurred. Only in this way can the subjects of the childhood types of tuberculosis be determined. The negative reactors will require retesting at appropriate intervals, for the child who is free from infection to-day may become infected to-morrow. In a community comparatively free from tuberculosis more than 50 per cent. of the children may give a negative test, but even so the number of skiagrams required will be sufficiently large to daunt less progressive races. In America however special plant has been devised with which it is possible to take a thousand paper skiagrams on a single machine daily. Thus the scheme is by no means impossible. (2) Areal surveys will be required for the protection of young persons who have arrived at the vulnerable teens. Dr. Myers draws attention to the risks run by students who share bedrooms, by medical students clerking in tuberculosis wards, and especially by nurses. His statement that "under existing conditions the nursing care of the tuberculous is a hazardous occupation" is perhaps true for certain institutions where consumptives are confined in hospital wards. As applied to sanatorium nursing the statement is not supported by observations in this country though proof is difficult, for it is possible, as he points out, that an infection received in young adult life may be the ultimate cause of phthisis in middle or old age. Few would dispute the advisability of skin tests and chest radiograms for nurses commencing work among the tuberculous, or the need to keep them under unobtrusive but watchful supervision. (3) No scheme could provide for a similar system of tests for the adult community, but the methods employed among the young can and should be applied to the examination of contacts. Only in this way can the sources of infection be traced.

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[2] Moss, K. N.: Proc. Roy. Soc. B., 1923, xcv., 181.

[3] Dill, D. B., Jones, B. F., Edwards, H. T., and Oberg, S. A.: Jour. Biol. Chem., 1933, c., 755.

[1] The Child and the Tuberculosis Problem. By J. Arthur Myers, Ph.D., M.D., F.A.C.P., Professor of Preventive Medicine, University of Minnesota. London: Baillière, Tindall and Cox. Pp. 230. 17s. 6d.

An analogy is drawn by Dr. Myers between the use of the Wassermann and tuberculin tests which seems hardly justifiable. When a positive reaction is obtained with the former immediate treatment is instituted, and no one would question its propriety. Dr. Myers argues that a positive tuberculin reaction is an equally imperative indication for treatment. But in the case of syphilis specific treatment is at our disposal and the risks of neglecting to adopt it are grave. In tuberculosis we have no such specific treatment, and many infected children exhibit no obvious symptoms of ill-health at the time of infection, and pass through life unscathed by tuberculous disease. When demonstrable disease is present sanatorium treatment should be provided. This applies not only to children who betray the symptoms of ill-health, but to those cases in which there is evidence of disease—enlarged root glands, "epituberculous" manifestations—in the chest radiograms of apparently healthy children. Few beds will be required for these, and the subjects of allergy, as revealed by the Mantoux test, need not be segregated in special institutions or receive other treatment than that required by all children—viz., adequate rest, nourishing food, decent homes.

MISSING FACTORS IN ANÆMIA

Seven years ago G. R. Minot and his colleagues showed that whole liver is effective in the treatment of Addisonian pernicious anæmia. Subsequently liver was found useful in all the other megalocytic hyperchromic anæmias of gastro-intestinal origin. A brilliant series of experimental observations initiated by W. B. Castle suggested that this "pernicious anæmia factor" in liver is formed by the interaction of a factor present in normal gastric juice (the intrinsic factor) upon an extrinsic factor present in the food ingested. J. F. Wilkinson in this country and C. C. Sturgis and R. Isaacs in America then showed that hog's stomach is as effective as whole liver in treating Addisonian pernicious anæmia. Marmite in the meantime was found as satisfactory as liver in the treatment of tropical megalocytic anæmias and of megalocytic hyperchromic anæmia associated with idiopathic steatorrhœa; in Addisonian pernicious anæmia, on the other hand, even when given in large quantities, it has not proved uniformly valuable, though it may initiate slight improvement. Hence it appears that all megalocytic hyperchromic anæmias associated with gastro-intestinal disturbance are cured by liver, and, as far as has been tested, by stomach; but only certain of them are relieved by marmite. There seems therefore to be an essential difference between the hæmopoietic principles in liver and marmite, though their chemical properties are in some respects similar, both being thermostable and soluble in alcohol and water. It has been suggested that marmite owes its effectiveness to a rich and concentrated content of extrinsic factor, and that it is useful only so far as the stomach retains the power of secreting the intrinsic factor. It is possible, however, that it contains at least some small amount of the fully formed pernicious anæmia factor similar to that in liver.

Observations by Dr. Wilkinson and Mr. Klein published in our present issue indicate that the effective principle in stomach also differs from the pernicious anæmia principle in liver. Here, however, there are important chemical differences between the two hæmopoietic principles, since the liver principle is relatively thermostable, is readily extracted, and is soluble in alcohol, whereas the stomach principle is thermolabile, insoluble in alcohol, and extremely difficult to extract. Again, the principle of stomach obtained by fractionation is present in the protein precipitate, that of liver in the filtrate. Wilkinson and Klein have tried to analyse the nature of the effective principle in stomach, and they conclude that it is probably of the nature of an enzyme. This enzyme, to which they give the name hæmopoietin, is probably identical with Castle's intrinsic factor. By incubating the thermolabile hæmopoietin-containing fraction of stomach with beef muscle they find it possible to prepare a thermostable active product which has some at least of the characteristics of the pernicious anæmia factor in liver. They believe therefore that they have synthesised this factor by the interaction in vitro of intrinsic factor (or hæmopoietin) present in gastric juice and stomach upon extrinsic factor present in beef muscle. This view is supported by the fact that though it has proved extremely difficult to prepare a satisfactory stomach preparation for parenteral injection, it is quite easy to make an effective preparation of this kind from the synthesised pernicious anæmia factor. Stomach extracts, it is suggested, owe their value to their content of intrinsic factor—which reacts with the food ingested—of fully formed pernicious anæmia factor made by the interaction of hæmopoietin and gastric muscle.

ANNOTATIONS

SHOULD FIRE INQUESTS BE REVIVED?

LAST month a protracted trial ended in the conviction of a gang of fire insurance swindlers. They stocked premises with over-insured goods, lit their fires, and made their fortunes at the insurance companies' expense. So large were the sums involved that the danger to human life was almost overlooked until Mr. Justice Travers Humphreys sternly reminded the prisoners of this aspect of their criminal activities. The ease with which these audacious conspiracies were engineered must have been a painful shock to the public. We were told how a solicitor's suspicions were aroused, how he and his allies devoted months to the sole task of shadowing the suspects, analysing their bank accounts and business transactions, how thousands of one pound notes ("the currency of fraud ") were traced through many hands, and how by almost superhuman patience and industry the widespread crimes were revealed to the satisfaction of a jury. Would the criminals have enjoyed so long an immunity if coroners held inquests upon outbreaks of fire? It is common knowledge that the wisdom of our ancestors originally entrusted this duty to coroners, and that in many cities the coroner continued to exercise this jurisdiction until litigation over a Manchester fire in 1860 gave the High Court the opportunity to declare that non-fatal fires were no business of the modern coroner. We know also that the City of London Fire Inquests Act of 1888 sanctioned a local survival of the old jurisdiction and that the late coroner for the City, Dr. F. J. Waldo, carried out this duty with exemplary care and with a firm belief in its service to the public, investigating sometimes as many as 150 fires in the year even though inquests were held in only a small proportion of these cases. In 1910 the Home Office Committee recommended that what was good enough for the City of London might well be made available for adoption elsewhere. After the war the London County Council asked that its coroners should be given powers of fire investigation, but disagreement on details caused Parliament to postpone attention to the proposal pending general legislation whereof nothing has since been heard.

With an admirable public spirit the principal insurance companies undertook the heavy responsibility and cost of the recent prosecutions. It is not a question of commercial interests only. Arson in crowded centres means the jeopardy of human lives. Would this risk be diminished if coroners were given back their ancient powers of fire inquiry? To this question Dr. Waldo's experience answers with a confident affirmative even if the comparative statistics of fires in London and elsewhere does not support the conclusion that the special legislation for the City has conferred any noticeable immunity from fire outbreaks. It was Dr. Waldo's practice to call accountants and fire experts to give evidence. The proceedings in his court usefully drew attention to dangerous structures, and the lack of proper fire escapes and appliances. He has lately stated that his records show 25 fire inquests held in the City in the year 1921; in no fewer than 11 of these a verdict of arson was returned. One such inquest revealed the work of an alien who was afterwards convicted and deported. In another case the coroner himself, on a prompt personal visit to the scene, discovered an empty petrol can. On this occasion Harris, one of the gang recently convicted, was closely examined, and the coroner decided to watch his future association with such matters. Later the same man's name was mentioned in connexion with another fire; but the outbreak had occurred, perhaps significantly, just outside the City boundary, and therefore was beyond its coroner's jurisdiction. The obvious difficulties of accumulating evidence for the purposes of the recent trial enable us to appreciate that ordinarily the police can take no action upon mere suspicion. A magistrate will not act until a definite case is established. On the other hand, the coroner, both by preliminary inquiry and by formal inquest, has authority to act judicially in sifting matters of suspicion. As no individuals are necessarily accused before a coroner, the scope of an inquest is untrammelled by the restrictive rules of evidence which apply elsewhere. The publicity of the coroner's court must in itself be in some measure a deterrent. Our eyes have been opened to the perils of arson; we can hardly afford to neglect any weapon which may serve to defeat the fire-raiser.

SODIUM NITRITE IN HIGH BLOOD PRESSURE

INASMUCH as the kidney function is impaired in some patients with raised blood pressure, either as a primary or secondary event, it is important to know what effect, if any, drugs used with the object of reducing pressure will have on this function. S. Weiss and L. B. Ellis [1] have noted the effect of sodium nitrite on cardiovascular and renal function in normal people, in essential hypertension with and without renal involvement, in glomerulonephritis, and in patients from whom one kidney had been removed. They first studied the symptoms produced by large doses (3 to 5 grains), and found the commonest to be headache, weakness, giddiness, and faintness, the latter verging on unconsciousness in extreme cases. However, severe symptoms were seen in only about one-sixth of the patients. The heart-rate was usually increased by a few beats per minute, but the minute volume output of blood remained practically unaffected. The reduction of blood pressure with sodium nitrite was found to be greater in the hypertensive than in the normal individuals, although when expressed as a percentage of the initial pressure the drop was about the same in both. The reduced pressure was maintained rather longer in the hypertensive patients, though even in them it did not exceed two hours. The fall involved the systolic to a much greater degree than the diastolic pressure; it averaged 35 mm. Hg in the hypertensive cases, but occasionally the reduction was very great, for example, from 240 to 80 mm., such a fall being usually though not invariably associated with pronounced symptoms. The effects of the nitrite on renal function were the same in all groups of patients. Studied with the urea-clearance test—i.e., output of urine per minute multiplied by the ratio urine-urea concentration/blood-urea concentration—this function was never found to be improved after exhibition of the drug; it was either decreased or more commonly unaffected.

The conclusion reached from the investigations that sodium nitrite lowers blood pressure by a direct action on the smooth muscle of the larger arteries was based on the unchanged cardiac output, the relative stability of the diastolic pressure, and the absence of flushing of the skin; the last two observations are arguments against a dilatation of the smaller arteries, arterioles, and capillaries. Severe symptoms are explained by supposed selective action of the drug on different vascular areas, e.g., fainting in a patient in whom splanchnic arteriolar dilatation is relatively pronounced, while the cerebral blood flow is impaired from a lack of corresponding arteriolar relaxation. This selective action is attributed to physiological differences in the tissues concerned, but in diseased conditions another factor may operate to cause variable responses—namely, local vascular degeneration. In view of the inconstancy and short duration of its action, its failure to dilate arterioles, and a tendency to produce unpleasant symptoms, the authors consider sodium nitrite to be unsuitable for the treatment of high pressure cases. Moreover, since it may diminish renal function, its use in any case with damaged kidneys is held to be irrational.

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[1] Arch. Intern. Med., July, 1933, p. 105.

REAL AND IMAGINARY CONSTIPATION

THE well-worn subject of the vagaries of the human bowel is reviewed with humour and sanity by Dr. Robert Coope.[1] Although he refuses to be frightened by the bogy of intestinal intoxication, he nevertheless recognises that, when the condition does exist, it requires treatment on medical lines, surgery being contra-indicated unless there is chronic mechanical obstruction. The task of the physician, he holds, is to prevent undigested or partially digested protein from reaching the large bowel and putrefying there. This can be done by restricting the meat intake, and by giving pancreatic juice. Growth of putrefactive bacteria is said to be discouraged by a lacto-vegetarian diet, while carbohydrate fermentation can be delayed by the giving of large amounts of lactose, and certain tough fruits such as dates may help. Drugs are less important, though calomel, an alkaline powder containing lactose, and Burney Yeo's chlorine water mixture (without quinine) are recommended. Bowel lavage is condemned as harmful. Dr. Coope's suggestions are simple and practical, and should be of service to the practitioner daily confronted with the problem of constipation, whether real or imaginary. "If I don't get my bowels open at least once a day I feel miserable," is a statement with which he is only too familiar, and he may be tempted to wonder, with Dr. Groddeck, whether this feeling of misery is not sometimes purely psychogenic. Few of us, from our nursery days, have escaped warnings of the dire results of a "blank day." It may well be that this constant propaganda causes an obsession about constipation which is a greater danger than constipation itself.

CONTROL OF TRAFFIC IN NARCOTIC DRUGS

A NEW supervisory body has been set up, under the Convention of 1931, for limiting the manufacture and regulating the distribution of narcotic drugs in addition to the League of Nations Advisory Committee on Opium and Dangerous Drugs and the Permanent Central Opium Board. The personnel consists of Sir Malcolm Delevingne (British), Mr. Herbert L. May (American), Prof. Tiffeneau (French), and Dr. H. Carrière (Swiss). It will be their duty to see that the quantity of the drugs manufactured is limited to the estimates of medical requirements supplied in advance by the several governments not later than August 1st in each year. No country will be permitted to manufacture drugs in excess of such estimates; imports and exports will be internationally controlled, and checked ex post facto by the annual statistical returns.

At the recent session of the Permanent Central Opium Board at Geneva the present situation in China was regarded as disquieting. Not only has the disturbed state of the country led to recultivation of the opium poppy, but it is notorious that for years China has been flooded with large quantities of morphine and heroin smuggled from abroad. A new and most disturbing feature, however, is the establishment of clandestine factories of the alkaloids in various parts of the country. Discoveries of illicit factories of morphine have been made in the western district of Shanghai, in Tientsin and at or near Dairen. The advisory committee in reporting to the Council of the League of Nations justly observed that "nothing but the effective control of the production and supply of raw opium will render impossible the establishment of works of this kind in districts where opium is grown or is easily available." In response to the appeal of the Chinese delegate a subcommittee has been appointed consisting of representatives of the interested powers to coöperate with China in suppressing illicit traffic and factories of narcotic drugs as well as to assist in the campaign against the use of prepared opium as contemplated in chapter iv of the Hague Opium Convention of 1912.

ARE CHILDREN'S HEART HOSPITALS JUSTIFIED?

THE doubts held by a substantial body of people whether the huge expenditure on sanatorium treatment is justified by results are now being reflected in discussions on the value of special convalescent heart hospitals for children. At the recent annual session of the American Medical Association, Dr. W. D. Stroud and his co-workers in Philadelphia brought forward observations[1] on 458 children with rheumatic heart disease cared for at the Children's Heart Hospital in Philadelphia over a period of ten years. Of these 98 are known to be dead (21·4 per cent.), while 138 are back at school and 22 are working; 20 are unable to work because of heart trouble, 22 for other reasons, and 7 are in hospital. Unfortunately, it appears from the tables that 151 of the children have not been followed up, so that the total mortality and morbidity may very well be more than is stated. It is interesting to note, however, that a comparative study in this country by Carey Coombs over a similar period also gave a mortality-rate of 21·4 per cent. In the Philadelphia group a large number of children (124) stayed in hospital less than two months; this group included many children, overwhelmed by infection, who never should have been sent from the wards of a general hospital to this special institution, and such patients were usually returned to the city hospitals within a few weeks. In the course of the discussion on these figures Dr. A. G. Young expressed disappointment that despite the care and money expended and "the best treatment we have to offer" nearly 50 per cent. of the children were either dead or helplessly disabled. It is therefore important to examine Dr. Stroud's results in detail to see what advantages these "heart hospitals" provide and what methods might be adopted to improve the results obtained. An alternative discussed by Dr. Stroud that in view of the rarity of the disease in tropical climates the money used for institutions should be devoted instead to transferring the affected children to the tropics until they are past the age of puberty may be dismissed as impracticable. The educative value of the heart hospital system on parents has been stressed, but it is surely possible to teach parents how to handle children with defective hearts through rheumatic supervisory centres, as is being done on a widespread scale in London and other cities. It has long been recognised that the production of permanent and serious damage is not due to the number of valves of the heart involved, but to the severity of the toxæmia brought about by frequent reactivations of the rheumatic process. Such reactivations seem often to follow infections of the upper respiratory tract, and the protection of the rheumatic child from these infections, especially in the late winter months, is of great moment. Removal to a special institution undoubtedly helps to secure this, but experience in this country, reported by Schlesinger and Sheldon, shows that such infection may occur even in special hospitals. The treatment of rheumatic heart disease in childhood, as was pointed out in the discussion, is still largely "supportive" rather than "aggressive" and it was suggested that certain auxiliary methods may prove of value in bringing the results of "heart hospitals" up to a higher standard. One of the speakers pinned his faith in chemotherapy, a line of treatment which requires much further investigation, while Dr. Stroud has already been making use of intravenous streptococcus vaccine preparations (with a streptococcal nucleoprotein prepared by H.F. Swift), through which it is hoped to improve the resistance of the child to further infection. To the primary question of the justification of continuing the treatment of rheumatic heart disease in the Children's Heart Hospital, Dr. Stroud and his co-workers sum up their reply under three headings. They consider that their results are as satisfactory as those in any similar group of children so far reported; the careful training of the parents is regarded as a valuable contribution in the treatment of the disease; and the transfer of rheumatic children to a tropical or semi-tropical climate does not seem practicable. There seems to be a certain lack of enthusiasm about this answer which would not, we feel, be shared by those concerned with similar institutions in this country. The justification for continuing to support such institutions at present lies largely in the need for knowledge as to whether the treatment is really worth while when viewed over a long period.

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[1] Liverp. Medico-Chirurg. Jour., 1933, xli., 51.

[1] Jour. Amer. Med. Assoc., August 12th, p. 502.

VESTIBULAR NYSTAGMUS

AN act of piety on the part of Prof. R. Claoué provides us with a readable account of vestibular nystagmus which is no less welcome because it was originally prepared by his father for the benefit of the practitioner.[1]

The brochure conveys a consistent theory in a small compass. The theory is based on an experiment of Ewald, who found that by artificially producing a current of endolymph in the external semi-circular canal of a pigeon he could produce nystagmus either to the right or the left according as the current was directed towards or away from the ampulla, where is placed the termination of the vestibular nerve with its cilia. It is to be noted that the oscillations in this form of nystagmus consist of a slow movement of vestibular origin followed by a rapid one in the opposite direction caused by a reflex reaction of the centre, and this last being more noticeable determines the direction in which the nystagmus is said to lie. Theoretically there should be three planes in which vestibular nystagmus may occur, but clinically there are only two—horizontal and rotatory. This is because the fluid in the two vertical canals has a connecting channel. Horizontal nystagmus is the commoner variety and its implications less difficult to comprehend. Along with it go vertigo and loss of equilibrium with a tendency to fall either to the right or the left. Supposing an inflammation of the right labyrinth to be present with nystagmus towards the left and vertigo, the patient sees objects apparently moving to the left as if he himself were moving to the right. To correct this sensation he turns his body to the right and tends to fall in that direction. Similarly, the direction of the fall depends on the initial position of the head. If the right labyrinth is diseased and the head is turned to the left, it becomes anterior, the nystagmus is directed forwards, and the tendency to fall will be backwards.

The effects of applying cold fluid or cold air to the ear and of the rotatory chair in producing nystagmus are explained on these lines, and the help which the varieties of this form of nystagmus may afford in the diagnosis of obscure nervous disease is indicated. Three examples are given. One is a purulent inflammation of the labyrinth, a second is an isolated cerebellar abscess, and a third a combination of these conditions. There may be little here set out which is not to be found in treatises of otology or neurology, but the neurologist as well as the practitioner will read it with profit.

ATEBRIN FOR MALARIA IN MALAYA

THE study of malaria at the Naval Base, Singapore, has afforded unique opportunity during the last four years for comparison of the end-results of various lines of treatment. Surg. Lieut.-Commander Duncan, R.N., states[1] that prior to 1931 treatment consisted of giving quinine grs. 30 daily for three days and grs. 20 for seven days; the patient was then discharged to duty, but took quinine grs. 10 daily for a period of 30 days. In 1931 a modification of Sinton's alkaline treatment was introduced, and for the following year this was the routine treatment; on the whole the results were slightly better inasmuch as headache, giddiness, deafness, and vomiting were not so frequently noted; but that year the number of relapse cases amounted to one-third of the total malarial admissions to hospital. During 1932 the alarming increase in the number of malaria cases led to a revision of therapeutic measures. The alkaline treatment was abandoned and cases were given a ten days' course of quinine grs. 250 in all and then discharged to duty, each receiving grs. 15 for 30 days. At one period the list exceeded 700, and the inconvenience and expense (about £4 sterling daily) they caused was enormous. During September, 1932, nearly one month after fresh infections had been reduced to a minimum, readmissions continued to occur, some being the fifth, sixth, or seventh relapse after this treatment was given a trial. It was therefore decided to try Atebrin, and during the past 15 months over 400 cases have been treated with this drug. On the whole the observations corresponded with those of other observers. Atebrin was found to be easily administered, leaving no bitter taste in the mouth; it is therefore a convenient drug to give to children. The comparative cost of atebrin, plasmoquine, and quinine per case worked out as follows:—

Quinine.—One month's course (about grs. 450), 2*s.* 6*d.*
Atebrin.—Five days' course (grs. 22½), 1*s.* 6*d.* to 2*s.*
Plasmoquine.—Five days' course (grs. 2½), 10½*d.*

Patients under treatment with atebrin remained bright and cheerful. The proclivity to pigmentation varies greatly. The optimum dose is 0·1 g. (or grs. 1½) three times daily for five days, subtertian cases being given also gr. ⅙ of plasmoquine three times a day. Even infants were found to tolerate atebrin well in appropriate doses. In the out-patient treatment of benign tertian malaria it appears to have been more successful than quinine. The increase of the percentage of hæmoglobin in the blood during the course of treatment is noteworthy.

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[1] Le Nystagmus Vestibulaire et les Réactions de Mouvements. By R. Claoué, Professeur libre d'oto-rhino-laryngologie (Bordeaux). Paris: Norbert Malone. 1933. Pp. 64.

[1] Malayan Med. Jour., 1933, viii., 79.

In the course of more exact observations it was noted that all parasites disappeared from the peripheral blood after 0·8 g. of atebrin had been given over a period of two and a half days. In subtertian infection all asexual parasites disappeared from the peripheral blood after 1·0 g. had been administered over a period of three days. The possibility is noted that atebrin may exert some delayed action on sexual forms since these disappeared four or five days after treatment; but plasmoquine gives more certain and quicker eradication. In 93 per cent. of benign tertian cases the temperature dropped to normal within 44 hours and there was no subsequent rise. In subtertian infections the temperature dropped to normal in from 48–56 hours, but there was no difference noticeable in the temperature charts whether the case was treated with atebrin alone or in conjunction with plasmoquine. The immediate effect of the drug on enlarged spleens during treatment was satisfactory. After an interval of some months 77·4 per cent. of cases with splenic enlargement showed a marked decrease in the size of the spleen. The immediate results of atebrin treatment of malaria on a large scale under natural conditions were thus highly favourable. Its chief merit over quinine seems to be the prevention of relapses.

BISMUTH SUBNITRATE AND METHÆMOGLOBINÆMIA

THE publication of another case of methæmoglobinæmia following the administration of bismuth subnitrate adds to the evidence which led the Pharmacopœia Commission not to include this salt of bismuth in the B.P. 1932. The complication although rare is definite enough to be borne in mind. The case related[1] by Dr. H. E. Roe of Chicago was that of an infant who, when 40 days old, received 190 grains of bismuth subnitrate within a period of 48 hours for the treatment of intractable diarrhœa. Before death signs of anoxæmia developed, and at the post-mortem examination the blood showed the chocolate brown colour of methæmoglobin which was proved spectroscopically to be present. In Dr. Roe's survey of the literature is mentioned van den Bergh's demonstration that nitrites can form in the bowel from nitrates and then be absorbed. Experimental work is also quoted which indicates that methæmoglobinæmia can be produced by nitrite injections. Although due importance must be paid to these observations, it should be added that the catastrophes cited in clinical practice have occurred in patients who were debilitated or toxic, and therefore unlikely to tolerate massive doses of any potent drug. This fact is not overlooked by Dr. Roe when he mentions the contributory adverse influence of otitis media, intestinal intoxication, and hypostatic bronchopneumonia, all of which were present in his own case. It would appear then that there are circumstances in which the choice of the subnitrate may be attended by disaster, a fact which should be taken to heart by practitioners who may have used it without untoward result for a long period. Dr. Roe comments on the fact that in six pædiatric text-books, under the treatment of summer diarrhœa, the use of bismuth salts is recommended without mention of the possible dangers of subnitrate. Judging from experience already quoted[2] the danger is not recognised by some French observers.

A REMEDY FOR CHRONIC AMŒBIASIS

CARBARSONE belongs to the original series of organic arsenicals prepared and tested by Ehrlich and Bertheim as long ago as 1909. Its full name is 4-carbamino-phenyl-arsinic acid; it is a white crystalline solid without odour or taste, and it contains 28·85 per cent. of arsenic. It is readily absorbed after oral administration and is excreted in the urine at about the same rate as stovarsol, but, experimentally, it is less toxic and is regarded as having more powerful amœbicidal properties, being eight times as lethal as stovarsol. The drug has lately been put on the market in pulvules of 0·25 g. (grs. 3¾) each, and favourable results have been obtained with it by A. C. Reed and others in America. This has led to its trial in the wards of the Carmichael Hospital for Tropical Diseases, Calcutta.[3] The criterion of cure applied in the series of 31 cases was five or more negative examinations of the stools on different days after the cessation of all treatment; but Lieut.-Colonel Chopra and his colleagues readily acknowledge that the patients could not be considered fully cured after such a short experience. They consider, however, that the proportion of probable cures to failures in this series was 5·75 to 1, as compared with 3·5 to 1 obtained by R. Knowles in a similar series treated with emetine bismuth iodide, and 3·16 to 1 obtained by H. W. Acton and Chopra with kurchi bismuthous iodide. The drug is given by the mouth in gelatin capsules twice daily for ten days. The patients were kept on ordinary diet and, apart from saline purgatives for the relief of constipation, no other drug was given.

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[1] Jour. Amer. Med. Assoc., July 29th, p. 352.

[2] THE LANCET, 1933, i., 1028.

[3] Chopra, R. N., Sen, B., and Sen, S.: Indian Med. Gaz., June, 1933, p. 315.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL.—From Oct. 2nd–28th an intensive post-graduate course in laryngology, rhinology, and otology will be held at this hospital. There will be classes in anatomy and physiology, operative surgery, pathology, and bacteriology, and a practical course in peroral endoscopy. The annual address will be given on Friday, Oct. 6th, at 4 P.M., by Dr. C. P. Symonds, who will speak on the clinical significance of vertigo. Further particulars of the course may be had from the secretary-superintendent of the hospital.

INTERNATIONAL CONGRESS OF HYDROLOGY.—The fourteenth meeting of the Congrès International d'Hydrologie, de Climatologie et de Géologie Médicales is to be held at Toulouse, France, from Oct. 4th to 10th, and will be followed by visits to health resorts in the Pyrenees. The meetings will take place in the faculty of medicine, where there will also be an international exhibition illustrating health resorts and methods of physical treatment. The presidents of the congress are Prof. Sabatier and Prof. Abelous, and the hon. secretaries Prof. Serr and Prof. Moog. The subjects under discussion include indications for stimulating cures for children, the hydrological treatment of certain infective conditions of the nervous system (introduced by Sir James Purves-Stewart), and the statutory control of spas and their use by the army medical services. The Ministry of Health is to be represented by Dr. Malcolm Campbell, of Droitwich, and the International Society of Medical Hydrology, which will hold a general meeting of members during the Congress, by Dr. W. G. Willoughby, medical officer of health for Eastbourne.

SPECIAL ARTICLES

BRITISH ASSOCIATION

ANNUAL MEETING AT LEICESTER

The Activity of Nerve-cells

THE presidential address in the section of physiology was given by Prof. E. D. ADRIAN, F.R.S. The aim of most physiologists, he said, is to explain the working of the body in terms of its constituent cells. The integrative action of the nervous system makes it responsible for the behaviour of the organism as a whole; in so far as his understanding of the mode of action of nerve-cells is concerned, the physiologist's attempt to explain the *actions* of the human organism is still sufficiently far from fruition for him to gain interest from the need for a similar explanation of its *thoughts* without being himself tempted to stray on to psychological or metaphysical planes. He remains concerned with defining those special properties of the cells of the nervous system—e.g., their conducting elements of great length and their multiple interconnexions—that underlie their effectiveness in providing rapid and appropriate responses on the part of the body as a whole to changes in its environment.

Experiments in tissue culture and in transplantation on amphibian larvæ have demonstrated the astonishing plasticity of the developing nervous system, both to influences from within the growing mass of nerve-cells and to those from without, that makes it able to accept an extra limb or sense-organ experimentally transplanted and to supply both more nerve-cells to govern its activity and more nerve-fibres to link it with the rest of the body. However diverse the final anatomical appearance of different neurones may be, it seems that all are originally cast in the same mould, and that their final differences in structure are the result, not so much of the innate properties of the cells themselves, but of diverse environmental influences exerted by the rest of the body in the course of their development. Associated with this singleness of their origin is the very close similarity of their activity: this is essentially rhythmic; the alternation of rest and activity, of repair and breakdown of surface, which has long been recognised in the case of peripheral nerve-fibres, has now been found to characterise the activity also of the central grey matter.

The spread of a disturbance along a nerve-fibre attached to a sense-organ that is excited by an external stimulus is an active process—i.e., it entails the liberation of energy at each "point" in succession along the nerve in a way or in a form such that the equilibrium of the adjacent "points" on the nerve are similarly disturbed. After the passage of such a wave of disturbance the resting equilibrium is everywhere restored in a very brief interval of time; the fibre is then ready to conduct another exactly similar wave of disturbance. However initiated, the waves of disturbance in a given nerve-fibre are all identical in magnitude and in rate of propagation. It is in the form of these waves of propagated disturbance that all afferent information reaches the central nervous system and that all its efferent messages leave it. The particular properties that underlie the initiation and the conduction of these waves of disturbance are highly developed in nerve-cells, but are not confined exclusively to them; thus muscle-fibres, which normally conduct similar but slower waves of disturbance, may be induced also to initiate them, but only by experimental artifices such as treatment with various salt solutions that in any case yield but a poor copy of the nervous mechanism.

The fate of the afferent impulses from the sense-organs and the genesis of the efferent impulses to the muscles, both within the central nervous system, is little understood. Its analysis in terms of spinal or of cortical reflex activity has gone far in the hands of Sherrington and of Pawlow respectively. Its analysis in terms of the electrical changes which accompany activity of the central grey matter has only just begun. At present the main difficulty lies in the interpretation of such electrical records. Whenever a group of nerve-cells is in action, in the cerebral cortex, in the brain-stem or in the retina, in a vertebrate or in an insect, these electrical variations have the same form. A series of waves of smooth contour, due to potential changes more gradual than those in the nerve-fibre, may be constantly recorded from the unanæsthetised cerebral cortex. In simpler parts of this, where most of the neurones are acting in unison, these waves may have a regular rhythm (5 to 90 or more per sec.) that rises and falls when the stimulus that elicits them changes in intensity. Therefore, in the central grey matter as in the peripheral nerve-fibre we have a reasonable picture of what is happening in a given neurone. The means by which spread of excitation takes place from one neurone to another is less well understood; that chemical as well as electrical changes play a part is suggested by the much greater influence that chemical changes have on the activity of the grey matter than on that of the nerve-fibre.

That localisation of function within the cerebral cortex is a concern of large masses and not of specific neuronic pathways, and that the reactions of the cortex cannot be explained in terms of anatomical models of groups of neurones, is shown most clearly in the analysis of habit-formation and of adaptation to injury. We learn to recognise shapes seen, and we learn to give complex motor responses, by the acquisition of "patterns" of cortical activity rather than by the lowering of specific synaptic resistances and the channeling of nervous pathways. The central nervous system of an insect will adapt itself to the loss of a limb by the complete reorganisation of its efferent motor control. The central nervous system of a mammalian vertebrate is capable of re-learning acquired habits that have been lost through experimental destruction of those parts in which these habits are normally localised. These acquired responses of the cortex can nearly all be learnt, and nearly all destroyed responses can be re-learnt, in any part of the original or of the residual cortex, respectively. It is upon the total mass of functionally active cortex and not upon its distribution that this property of learning depends. Conversely, the effects of an injury in terms of loss of responses depend upon the amount of grey matter destroyed and not upon the interruption of specific intracortical connexions.

For an understanding as to how acquired responses are stored in terms of the activity of extensive masses of the cortex and not in terms of specific neuronic pathways, we need not be forced outside the conceptions of physiology. Perhaps measurement of the actual number and combination of neurones essential to the acquisition of a given response or analysis of the reactions of isolated parts of the cortex may forward this understanding. The production of collective rhythms of electrical discharge may be taken to indicate activity in a group of cortical neurones that are active in unison and functioning as a unit. The recording of electrical disturbances from the cerebral cortex thus supplies us, Prof. Adrian concluded, with another line of investigation; it supplies us with a fresh set of data and may give a new outlook on the working of the brain.

The Practical Value of Physiology to Industry

Dr. G. P. CROWDEN, speaking to the Department of Industrial Coöperation, pointed out that physiology has a dual field of application in industry—namely, to the worker in relation to his work and also to the products of manufacture. On the one hand, nearly 16 million men and women in England and Wales are engaged in industry, and the daily cycle of work, fatigue, and recovery must be in equilibrium if the health, comfort, and efficiency of these workers are to be maintained. On the other hand, the products of such industry, including such things as heating, lighting, ventilation, and clothing, are themselves primarily designed to supplement or aid the natural powers which the human body possesses of adapting itself to its environment. Hence both production and product require that the physiological needs of man should be studied and understood.

The various physiological factors to be considered in any single problem of work fall into four distinct though mutually reacting groups as follows:—

1. The *work factor* comprises the study of the muscular effort involved—whether heavy, moderately heavy, or light—and the performance of that effort with minimum fatigue and optimum efficiency.
2. The *environment factor* includes temperature and humidity, lighting, noise, and vibration.
3. The *time factor* offers problems concerning the optimum duration of work shifts in relation to the severity of the work and the strain of the working environment. Further, the rate of execution of the work may produce unnecessary fatigue unless it is adjusted to the physiological powers of the worker.
4. The *personal factor* differs from the other three in that it is essentially under the control of the individual worker, though the others are almost entirely under the control of the management. For example, it rests with the worker whether he makes proper use of protective clothing or respirators, whether he adopts methods of working and resting recommended, or whether the family food is bought to the best advantage. Only education, understanding, and above all goodwill between employees and employers can ensure that this factor does not discount the good which might be done by proper attention to the other three. The proper selection of operatives according to their aptitudes and physical fitness is of course essential for the best results.

In any one problem all these factors must be taken into account. It would be of little benefit to a worker if he were carefully instructed to perform a manual task, in such a way as to increase his efficiency, if the conditions of temperature and humidity of the working environment were such that the strain imposed on his body was excessively great.

Even at his best, man is only approximately 25 per cent. efficient in the mechanical sense, and this means that for every unit of useful work performed at least three times as much energy is wasted as heat, which must be got rid of from the body to its environment if the body temperature is to be kept within normal limits. It is only too easy for work to be performed at a much smaller efficiency than 25 per cent. by executing unnecessary effort or movements or working under conditions of postural strain, or even executing the necessary movements too rapidly or too slowly. By estimating the amount of oxygen used before, during, and after a task it is possible to determine the mode of execution of the work which permits the minimum expenditure of bodily energy. In heavy muscular work and also in continuous moderately heavy work this is desirable, but in light tasks the actual amount of energy expended matters little; indeed, in some occupations if more muscular effort and movement were involved the workers would in all probability benefit very considerably.

The moderately heavy continuous muscular work of carrying loads by women has been investigated by Prof. E. P. Cathcart and Miss E. M. Bedale and others at Glasgow, and it was shown that when the load was handled or distributed so that the normal erect posture was least disturbed the oxygen cost per unit of useful work done was a minimum. Further investigations showed that the maximum loads carried should not exceed 40 per cent. of the body-weight of the worker for continuous work nor be greater than 50 per cent. for intermittent carrying. The importance of avoiding postural strain, particularly in light continuous work, is not fully realised.

In the case of heavy muscular work by man an investigation was carried out on barrow work in the Fletton brick industry. It was clearly demonstrated that the actual stopping of the barrow owing to a badly arranged run between the kilns and the presses or rail sidings might involve the expenditure of 30 per cent. more energy per load by the worker. In such work the worker is getting quite enough physical exercise, and any wasteful expenditure of energy per load may amount to a great deal at the end of the working day during which he may have handled 140 barrow-loads of bricks. It was also shown that the normal brisk walking pace of the worker was more economical than either a deliberately slow walk or a forced walking pace such as is often adopted by men on piece-work when emptying the kilns of burnt bricks. Moreover, ways of loading the bricks on the barrow in accordance with the stature of the individual were studied, and a working routine devised whereby new workers could be readily advised as to the optimum arrangement of the load to suit the natural height of their hands above the ground level.

In light-speed work, such as in the boot-making industry, the actual expenditure of energy by women workers may be slight; but this does not necessarily mean that the fatigue produced will be proportionately small, for the work may entail the continuous use of the fine muscles of the hands and fingers, and may necessitate continued postural strain unless the height of the work bench or seating is properly adjusted to suit each worker. Static effort or continued muscular strain is particularly fatiguing, and I believe in Russia at the present time physical exercises are occasionally introduced during work periods in order to compensate for the harmful effects of prolonged postural strain which certain types of industrial work of necessity involve. In this country and America physical recreation and training is encouraged by many industrial concerns, and this is undoubtedly of the greatest possible value to employees whose work is manual but sedentary.

In many types of work the introduction of mechanical devices and tools operated by compressed air has profoundly changed the character of the effort on the part of the worker, though the product of his labour is the same as before.

In the case of the road-breaking pneumatic hammer or the riveting hammer, the worker's muscular effort is exerted against the mechanical tool in order to guide it and keep it in position to do its work. His actual oxygen consumption and expenditure of energy may be much less per unit of useful work done than if he used a sledge hammer, with the use of which he did at least have the stimulus of dynamic effort and the increased circulation of blood and variety of movement entailed thereby. Postural strain and static-gripping effort with pneumatic tools are increasingly replacing the former dynamic muscular work. Dr. Crowden found that under certain conditions of external cold the hands of workers tend to become unduly chilled when using vibrating tools, and it appears that if the hands are cold the blood-supply to the fingers is more likely to be affected by vibration than if they are kept warm; no doubt the cushion effect of a good blood flow through the fingers and hands damps down the vibrations and protects the delicate tissues from injury by repeated mechanical shocks.

Another subject investigated by the speaker was the effect of noise on hearing—"boiler-maker's deafness." The acuity of hearing of a number of riveters and non-riveters in H.M. Dockyard at Devonport was measured, and it was evident that riveters and holders-up after 15 years or so on the job showed distinct deafness in both ears of a degree which would amount to a serious handicap in a school-child. This condition is probably preventable if the workers will use a very simple ear-stop of cotton-wool and paraffin wax.

Many experiments have shown the importance of paying due regard to the physiological limits of vision.

In a branch of the hosiery industry, for example, eyestrain was produced by the effort of converging and focusing both eyes on fine silk threads which had of necessity to be held close up to the eyes for them to be seen at all. Suitable spectacles were tried on workers with normal sight, and it was found that not only was there a material reduction in fatigue but a considerable increase in the rate of working—namely, results mutually beneficial to both the workers and to the industry.

The temperature, humidity, and movement of the air or, speaking generally, the conditions of ventilation in a factory, workshop, or mine are also well known to exert a profound influence on the health and working capacity of the workers, particularly if the work is heavy and the physiological cooling power of the air is low. In hot and deep mines the problem of maintaining a physiologically safe working environment is a very difficult one, and physiological tests have proved useful in picking out men who showed abnormal reactions to work under such conditions, and who might develop heat stroke if sent to work in the mines without a preliminary period of less severe work. By suitably adjusting the acclimatisation period for the susceptible men it seems possible to minimise the risk of heat stroke and heat collapse. However, physiological tests alone are not enough in such extreme cases as this. If the mines are to go deeper, engineers and medical scientists must collaborate, the latter defining the physiologically permissible limits of temperature, humidity, and air movement, and the former devising ways and means of ensuring the maintenance of such conditions in the working environment.

In conclusion, to illustrate the application of physiology to manufactured products, Dr. Crowden referred to some observations on the heating of school classrooms by different methods, and also to an investigation on protection against external heat.

The Status of Psychology as an Empirical Science

Prof. F. A. P. AVELING in his presidential address to the section of psychology quoted Eddington's statement that we either know mind directly as an experiencing entity or we merely know phenomena. His own thesis was that we know both—partly from introspection and also because unless we grant the immediate awareness of the self as existing and active we cannot account for our belief in the external world. Experience is as real as sensory experience in which the physical world is revealed to us, including our own bodies. The starting-points of physical science are the sense data—but these are abstracted from experience—a selection from it. Again physical science makes use of concepts which it does not find in the world of sense. What Eddington calls "remote inferences" are only made possible by the occurrence of mental processes which are not a part of sense data. It is a characteristic of the physical sciences that they rely upon concepts and return to empirical data for verification. Psychology however accepts the whole of experience and in that sense its content is richer than that of the physical sciences and therefore actually more empirical. To begin and end with sense data alone is a philosophical prejudice. Experience includes affective and volitional events—thought-things as well as sensed-things. Yet physical science, arid and colourless, claims to deal with "reality." The experiences which the physical sciences reflect are no less essential for a complete and comprehensive picture of reality—in the Cartesian sense such experimental data as self-awareness are not merely convincing but indubitable (*Cogito ergo sum!*).

Prof. Aveling supports his thesis from both structural and functional analysis. On the analogy of chemistry, splitting of wholes reveals elements, but the mere addition of these elements of the mental alchemy no more reproduces wholes than addition of constituents reconstitutes the compounds of chemistry. Introspection does not merely discover elements, but relations and correlations. Particularly is this so as regards the discovery of causal relations. By functional analysis we discover the laws of occurrence—i.e., the relatedness of physiological and psychological events (Weber's law). All conclusions based upon such investigations are heavily weighted with conceptual constructions. In such processes of experience we deal not alone with sense data but with ideal and real elements and an ever-active self. Physiological events do not contain the principles of their own explanation within themselves. We have to use such terms as energy and cause to explain changes and relationships—each borrowed from psychology. The history of science demonstrates the attempt since Aristotle to explain "matter" and "form" which are through and through coloured by agency and causation. The successive modifications of the concepts of cause are efforts to de-anthropomorphise science. Thinghood and unity cannot be envisaged in the absence of the immediate awareness of ourselves as unitary, existent, and self-identical beings. "My notion of unity," said Prof. Aveling, "is derived from the same source of immediate, non-sensorial experience of myself and analogically applied to sensed-things and thought-things alike." Similarly "energy" is a concept not to be discovered among the particulars selected from sense. The self is the only real continuity that is immediately known to us. It is always at work. The "self does actualise, or energise in different ways—now perceiving, now judging, now resolving, now enjoying." The whole grandiose structure of science rests upon the concepts of relatedness and agency—concepts which cannot be derived from sense data alone but from the totality of experience which is the subject matter of psychology. Thus psychology becomes the most empirical of the sciences.

PROBLEMS OF MEDICAL PRACTICE IN AMERICA

(BY A SPECIAL CORRESPONDENT)

II *

I HAVE already pointed out that the report of the Committee on the Costs of Medical Care afforded evidence that on the ordinary methods of private practice large and steadily increasing classes of the American people are unable to pay for the medical care they need. This result is attributed in great part to the development of medical science, which has led not only to the growth of specialisation but also to the use in many cases of team-work as an essential condition of successful treatment. About 23 per cent. of the doctors in the United States limit their practice entirely to a special branch of medicine, and another 21 per cent. are partial specialists. In large urban centres specialism has developed to a greater extent than these figures indicate; in cities with 50,000 population and upwards, less than 40 per cent. of the doctors devote themselves entirely to general practice. The growth of specialisation has been accompanied by an increased reliance upon capital investment. Medical care becomes more and more dependent upon the use of a scientific equipment, involving capital expenditure beyond the resources of all but a comparatively few individual practitioners. More important still is the capital investment in hospitals; in America the hospital, which is in many cases a proprietary institution conducted on a self-supporting basis, has largely been substituted for the patient's home as the most suitable place for the diagnosis and treatment of severe illness. Medical care, then, in its economic aspects, presents two of the features of modern industrial evolution: an increase in specialisation, and in the use of capital investment to provide buildings, apparatus, and equipment. It has made less progress towards the next stage in the evolutionary process—the integration of personnel and equipment in a coördinated system for the provision of medical services.

TREND TOWARDS INTEGRATION

There is, however, a growing movement in the medical profession towards integration. The substitution of the "office" for the doctor's residence for professional purposes is a tendency in this direction. It is now only in rural areas that the American doctor, whether general practitioner or specialist, sees his patients in his own house. Elsewhere he takes a set of rooms (or "office") in the centre of retail trade for his professional work. Even in towns of about 5000 population the doctor will have his consulting-room in "Main-street," not in the residential district in which he lives. In some towns buildings have been erected exclusively for the offices of doctors or dentists. In Dallas, Texas, for example, nearly one-half of the 500 doctors practising in the city have their offices in one building. The concentration of large numbers of doctors in the business centre of the town makes for the coördination of medical services; a general practitioner can arrange for his patient to leave his consulting-room and receive in the same building an X ray or dental examination or a laboratory test. In many cities groups of doctors have combined to reduce their practice expenses by a joint utilisation of waiting-rooms, scientific equipment, and technical and clerical personnel, while retaining an individual financial relation with their patients. There is a tendency also to use public hospitals for private practice. Nearly 1000 hospitals permit the doctors on the staff to see ambulatory cases as private patients in the hospital either before or after the various clinics held in the hospital are open to the public.

Perhaps the most significant feature in medical practice in America at the present time is the association of general practitioners, specialists, and dentists to form a "private group clinic." The movement has spread considerably since the war, and there are now some 200 of these clinics, chiefly in the smaller cities of the Middle West, in which from 2000 to 2500 doctors and dentists are associated. The outstanding characteristic of this form of practice is that the incomes as well as the expenses of the practitioners are pooled. Unless consultations are required, one practitioner only treats a given case, but there is no direct financial relation between individual doctors and patients; the financial responsibility for each patient is assumed by the whole group. Many clinics exclude certain special forms of practice, such as obstetrics, pædiatrics, orthopædics, or psychiatry, but for all cases that are accepted the clinic provides a full range of facilities for diagnosis and treatment, including laboratory examinations, roentgenology, physical therapy, cardiography, and tests for basal metabolism. For major surgical operations the clinic usually relies upon a separate hospital. Patients can select a practitioner from among the members of the clinic staff, and the "family doctor" relationship between doctor and patient is encouraged. From an economic point of view the clinic practitioners may be divided into two classes: the proprietors of the clinic, who share the profits, and the practitioners employed on a salaried basis. The proportion of the two classes varies widely in different clinics. In 27 clinics specially investigated by the Committee on the Costs of Medical Care it was found that the average net income per practitioner was about $9750 (£1950). Clinic practice enables considerable economies to be made in practice expenses, which in individual practice in America are equivalent on an average to about 40 per cent. of the gross income; in clinic practice the proportion for similar items of expenditure is about 20 to 25 per cent. It appears, however, that the economies thus effected do not result in lower fees to patients. Usually the fees are the same as those charged in independent practice. Most of the clinic patients are described as persons of moderate means, some are well off, and there are a few who are very poor. The clinics are in direct competition with local practitioners, who do not therefore utilise the clinic facilities unless their field of practice is not one of those included in the clinic's range of activities.

It is claimed that in group clinic practice the patients receive better service than they would from a number of practitioners in independent practice, and that by a more economical use of capital invested in equipment, &c., and of the practitioners' time, the cost of providing medical care is reduced. But since the economies are not reflected in lower fees the clinic does not afford a direct solution of the problem defined by the secretary of the American Medical Association as that of providing "adequate scientific medical care to all people, rich and poor, at a cost that can reasonably be met by them in their respective stations in life." Indirectly, however, it affects the problem, for it provides a basis for some of the various kinds of contract practice which have

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* Part I. appeared in THE LANCET last week.

sprung up in the attempt by the public to find a satisfactory solution.

CONTRACT PRACTICE UNDER LAY CONTROL

The present position of contract practice in America is in some respects similar to the position in this country, in the days when your special commissioner was describing the "Battle of the Clubs," as it was waged in the numerous centres visited by him. Increasingly, various methods are being adopted by the public to obtain medical care by periodic payments; in other words, by the adoption of the insurance principle. There is also the tendency, noted by THE LANCET commissioner in England 40 years ago, for lay organisations to exploit the profession by selling medical care as a commodity; and signs are not wanting that the profession is becoming alive to the dangers of the position, and is taking steps to protect its legitimate interests and its place in the community.

In the Western States, and especially in California, many lay organisations have recently sprung up to sell medical care for profit. The organisation issues health insurance policies and provides medical service through contracts with practitioners. The Committee on the Costs of Medical Care give particulars of a company that sells to the public at large a certificate giving the holder and his family the right to medical treatment by a practitioner appointed by the company. The premium covering the holder and his family is 25 cents (1*s.*) per week, and the method of medical remuneration is described by the proprietor of the company as follows :—

> "For every family assigned to the care of the doctor in his section, he receives 25 cents per month irrespective of whether his services are required or not. So that if we assign 400 families to a doctor he is assured of $100 (£20) a month income, for which he will probably be required to make from 50 to 60 calls, judging from the past experience we have had. Our collection cost runs about 25 per cent., which leaves 50 per cent. out of every dollar collected for overhead and profit."

It will be noted that the doctors employed by this company receive only 25 per cent. of the money collected from the patients. This form of commercialised insurance is naturally viewed with disfavour by the profession. The medical service is not infrequently obtained from the lowest bidder, and appears to be of a relatively low quality.

Another way in which commerce has intervened in the provision of medical care is by the application of the instalment system, which is popular in America, to the payment of doctors' bills. Within the last few years many proprietary organisations have been formed to purchase practitioners' accounts and collect in instalment payments the amount, or part of the amount due, or to lend money either to patients or practitioners to be repaid in instalments with added interest at a rate varying from 12 to 43 per cent.

Since the war there has been a considerable extension of the provision of medical service for persons employed by a firm or a group of firms. There is special need for such provision in the railroad, mining, and lumbering industries, in which many employees live in areas remote from ordinary medical facilities; and in these industries there are about a million employees who with their dependents receive medical care under special arrangements made by the industry. Usually industrial medical service is provided by the employer and may be on an extensive scale. The Endicott Johnson Corporation, of Binghamton, New York, a large shoe-making firm, employ a full-time professional staff of over 100 persons, including 28 doctors, 4 dentists, and 67 nurses, for the treatment of their 15,000 employees and their dependents. Sometimes the service is provided by an association of employees formed for the purpose, and the arrangements resemble those of the "poundage system," which was prevalent in South Wales before the days of compulsory health insurance. More frequently, however, industrial medical service is maintained by joint contributions of employers and employees, as in Roanoke Rapids, North Carolina, where five establishments have combined to provide a medical, nursing, and hospital service for their employees and their dependents. Each employee pays 25 cents per week as a deduction from wages, which amounts to a yearly total of $33,000, and the employers contribute a total of $56,000. The service is said to be highly efficient.

The Committee on the Costs of Medical Care find that industrial medical service has certain distinct advantages. It provides more medical care than the employees could afford to obtain from private practitioners: The doctors' incomes are larger than in private practice among persons of the same economic groups, and as their working hours are regulated they have more time for study and research. But the practitioners are under private lay control, which has in some cases been exercised with unfortunate effect on the efficiency of the service, and it is not surprising that the growth of this form of practice is viewed with apprehension by the profession.

CONTRACT PRACTICE UNDER MEDICAL CONTROL

The forms of contract practice so far described are under lay control, but recently a movement has begun for the provision of medical services on a contract system of payment by professional organisations. Many of the group clinics described above accept patients on a periodic payment basis, the usual payment being $2 (8*s.*) per month, for which an extensive range of service is provided. Generally the patients form an organised group, such as the employees in a department store, but some clinics accept individual patients on similar terms. The system is increasing in popularity and is rapidly being extended.

Within the last few years steps have been taken by several county medical societies for the provision of medical services on a contract basis. Some ten societies in Iowa and a few in other States have contracted with the local government authorities to furnish medical care to the indigent. Treatment is given by individual practitioners, and the control of the service is exercised by the society. Last year the medical society of Milwaukee county, Wisconsin, put forward a more ambitious plan, proposing the establishment under a joint medical and lay board of a "Community Medical Service" for the county, open to individual patients or groups paying a monthly subscription, varying with the income of the patient. Any member of the society could participate in the service if he wished to do so, and the patients would have free choice of doctor. It does not appear that the plan has yet been put into operation.

Thus there are two important movements to be observed in medical practice, as carried on in America at the present time: one, arising within the profession, towards the specialisation and integration of medical services; the other, arising outside the profession, towards the payment of medical costs on a contract or insurance basis. Progress in either movement has promoted progress in the other, and both have been effective in determining the conclusions of the Committee on the Costs of Medical Care, which I propose to deal with in my final article.

MEDICINE AND THE LAW

Unqualified Opticians

In 1917, when people in this country were anxious to distinguish friends from enemies, Parliament passed the Registration of Business Names Act. This, unlike much of the anti-alien legislation of the war-time period, was permanent law. At Leeds last week two men named Kibel and Freeman were summoned under the Act for having failed to put their names on a circular in which they canvassed for orders for spectacles and offered free advice and sight testing. The Board of Trade representative who prosecuted the two men seems to have admitted that the proceedings were really taken because unqualified persons posing as qualified opticians were a public danger. He informed the stipendiary magistrate that "the Government" were taking action to stop this loophole in the law, and that a Ministry of Health committee was even now sitting and taking evidence. Meanwhile the Registration of Business Names Act, he said, provided the only control available. The magistrate treated the matter as a merely technical offence and fined each defendant 40s. Before doing so he had elicited from the prosecution an assurance that the men had committed no offence by posing as qualified opticians. "It is an offence," he had remarked, "to pose as a doctor." Therefore the prosecution had observed that "the medical profession have their own rules." The observation doubtless meant that it is an offence under the Medical Act for unqualified persons to use the title or description of physician or surgeon. As reported, the observation is open to misunderstanding. There are no rules of the medical profession which prevent unqualified persons from posing as doctors. If "the Government" is really taking action to protect the public from the impositions of unqualified persons, there is a large field for its operations.

Unauthorised Hospital Collections

A youth of 17 named Myer Franco was bound over for two years and placed under probation at the Mansion House Justice Room last week on charges of obtaining charitable contributions for hospitals by false pretences. Without any authority he represented himself as a collector for the Middlesex and Metropolitan Hospitals. To these institutions he handed over small sums while keeping part of the collected money as what he called his "commission." The secretaries of both hospitals had warned him that he must give up the practice. He nevertheless continued his activities till complaints to the police caused him to be arrested while endeavouring to collect money in an office in King William-street. Alderman Sir W. Phené Neal observed that the public should be warned against unauthorised collectors of charitable contributions. There seems indeed a good case for more vigilant control. Street collections are regulated nowadays under Acts of 1903 and 1916; the enforcement of these statutes probably fails to check frequent abuse. The conduct of war charities is governed by another Act of 1916. Unauthorised house-to-house collection for hospitals is subject, of course, to the general law of false pretences; but it may not always be easy to establish by evidence the distinction between fraud and altruism.

BUDAPEST

(FROM OUR OWN CORRESPONDENT)

THE HEALTH OF BOY SCOUTS

The fourth World Jamboree was held in Gödöllő, in the huge parks of the royal castle formerly used by the late Emperor Francis Joseph. About 25,000 scouts were camping for about three weeks and it was no easy task for the health authorities to make provision for good drinking water, bathing accommodation, fresh food, sanitary services, and facilities for laundry. A fully equipped hospital was established for emergencies, with departments for infectious diseases too, and for dentistry. Fortunately the morbidity-rate was exceedingly low, although a certain amount of enteritis had been anticipated in view of the exceedingly hot weather and drought, and of the abundance of fruit available. Gödöllő is in the centre of the fruit industry, and at the time of the camp peaches, pears, melons, apricots, and plums could be had for almost nothing (a penny bought a kilo of pears). The health inspectors supervised all the fruits brought into the camp and only fresh, wholesome fruit was allowed to be brought in. Other foods were also inspected by medical officers; each nationality had its own camp kitchen, where the cooking was done according to national customs. The camp hospital, under the able management of Dr. Szukodáthy, remained free from any epidemic; 124 in-patients were admitted, amongst these being 17 British scouts. The number of infectious cases during the fortnight was 7; of these one each came from England, Hungary, Natal, Sweden, Bulgaria, France, and Holland, the diseases being measles, chicken-pox, diphtheria, and paratyphoid fever. Owing to the energetic isolation of these cases the diseases did not spread; before leaving, all boys were medically examined and no fresh case was discovered. Of the hospital in-patients seven Hungarian and four foreign boys were retained, one amongst these a Ceylon boy suffering from diabetes, and were conveyed to a Budapest hospital, with the exception of the two infectious cases, who were not moved. The dental section of the hospital made 243 extractions and in 148 cases dental treatment was given. During the whole duration of the jamboree—16 days—ambulance service was rendered by a detachment of the Budapest Ambulance Society. They were required for first-aid service in 1390 cases. On one day 300 calls were received. One death occurred, that of a Rumanian young man of 21 who suffered from volvulus. He was operated upon immediately after the attack, but gangrene of the small intestine led to peritonitis, and he could not be saved. Lord Baden-Powell expressed warm appreciation of the excellent hospital service and the French Life Saving Society presented a silver cup to the staff of the hospital.

REWARDS TO MULTIPARÆ

Six years ago a society was founded under the patronage of Madame Horthy, the wife of the governor of Hungary, under the title St. Stephen's Day Committee of Hungarian Mothers, with the aim of honouring mothers of large families. St. Stephen's day falls on August 20th, which is celebrated with much festivity in Budapest, St. Stephen having been the first crowned king of Hungary. This year the society has awarded prizes to about 1000 mothers. In the regions lying between the Danube and the Tisza rivers, families of 15–16 children are not unusual. The first prize goes to the mother of 25 children, and the second to one who had 20 children, 17 of them now living. From a medical point of view it is of interest that most of the mothers, particularly those of the better classes, do not show signs of physical strain. In most of these multiparæ the climacteric appears to be delayed and to cause little discomfort when it does come. Some of them bear children when over 50 and even as late as 54.

STEEL ALLOYS IN DENTAL WORK

Since the introduction of the Wippla Steel alloy for crowning teeth, it has been in common use by dental mechanics, because this alloy has proved to be a first-rate substitute for silver and gold crowns. Lately Dr. Frederick Hauptmayer, director of the hospital of the Krupp factory, Germany, launched a lawsuit against six Budapest dental technicians for infringing the patent right. At the trial Dr. Joseph Kalmár, a Budapest dental surgeon, joined the plaintiffs, arguing that he owns the patent right for the manufacture of the chrome-nickel-steel alloy for crowns. The judge seemed prepared to acknowledge the right of the plaintiffs, but the defendants' counsel argued that they should hear the leaders of the National Association of Dental Technicians and the Society of Dental Surgeons, because the right vested in this patent endangers the whole existence of the profession of dental mechanics. The judge adjourned the case and ordered the hearing as witnesses of the presidents of the societies mentioned.

CLOSURE OF MASSAGE ESTABLISHMENTS

According to reports from Bucharest the public health authorities of the Rumanian capital have issued an order which will put an end to grave abuses. It forbids the keeping of so-called massage establishments and at the same time sets out a new regulation which limits the sphere of action of masseurs. It is explained that this restriction was necessitated by the fact that massage establishments had become the haunts of secret vice. According to the regulations massage can only be practised on persons of the same sex, and only on healthy subjects, the so-called curative massage being allowed only under medical supervision. Cosmetic massage where no electrical appliances are used to send current through the body of the patients may be practised freely. The order subjects the professional masseurs to special examination and no licences to practise will be given to applicants who have been punished for any offence.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

A HOSPITAL WAITING-LIST

On Sept. 1st, 1933, the waiting-list of Edinburgh Royal Infirmary stood at 2908, which represents an increase of 139 since the last report. A waiting-list of 3000 is surely too serious for one of the largest and best conducted hospitals in Scotland. No doubt every effort is made to keep it down, but one wonders whether the reorganisation of the hospital service is being tackled with the vigour that the situation obviously demands. On the municipal side important steps have already been taken, but this only emphasises the urgency of the question. For if the new accommodation now available through the scheme of the municipality is not being used effectively to reduce the waiting-list, either the new hospitals are inadequate to the Edinburgh demand or there is some failure somewhere in the process of reorgan tion. To this it is not a satisfactory reply to say t the one hospital is voluntary and the others official. No such distinction can be accepted a real reply to the public demand.

THE RELIEF OF POVERTY

The figures for public assistance are still disc certing in their magnitude. The total numl receiving relief from public assistance authorities at July 15th, were: outdoor 273,369, and ind 11,329, compared with outdoor 228,224, and ind 11.905 at the same date last year. Increases h taken place with both able-bodied unemployed the ordinary poor. At July 15th there were 112, able-bodied unemployed receiving outdoor relief 578 indoor relief, as against 85,954 and 479 in 19 For 1933 the ordinary poor relief provided for 160, outdoor, as against 142,270 in 1932. For the ordin poor, however, there was a reduction from 11,42 1932 to 10,751 in 1933 for indoor relief.

When one reflects that these burdens have b going on for some ten years, and still show, in cert sections, material increases, the prospect for impro ment is very dim. Glasgow has had to increase rates by about *1s.* in the £ on this account alone.

THE MILK PROBLEM

In his annual report the Aberdeen county veterin inspector says that many farmers are keeping th best cows instead of fattening them off and sell them after a single lactation. This, he maintai should result in the building up of better dairy her Further, some farmers are adopting proper a economic methods of rationing based on the m yields. Few dairies have any special provision sick animals, and he suggests that each dairy sho have a properly fitted loose box set apart for aili cows. Mastitis is responsible for enormous los annually, the cows being practically rendered usel at the time when they are giving their heaviest yie There is at present no sure method of treatme whereby an affected quarter can be brought into acti use again, and the inspector urges that resear should be encouraged with the object of finding preventive and reasonably certain cure. He go on to say that an area where tubercle-free co can be purchased is badly needed. But such scheme would involve some effective methods eradication. Incidentally some dairymen are installi milking machines, and in consequence they have install efficient boilers for the production of steam a hot water; quite a number have now up-to-da sterilising cabinets. In this report it is suggest that the use of certified milk ought to be encourag more enthusiastically by the medical professio There is too much confusion in the minds of t consumers over the various grades at present, a there should be only two kinds of milk: milk fro tubercle-free cows and—milk.

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

AN EPIDEMIC OF ENCEPHALITIS

The most serious epidemic of encephalitis lethargic yet experienced in this country is at present causin alarm in St. Louis. Two epidemiologists from th United States public health service are studying th disease on the spot and the surgeon-general has also gone to the city. From August 7th to the 24th nclusive 213 cases were reported in the metropolitan area, with 28 deaths, and the peak of the epidemic has not yet been reached. On the basis of present experience it is estimated that the case incidence will be not less than 30 per 100,000 population. Thirty per cent. of the cases have occurred among persons over 55 years of age, who comprise only 13 per cent. of the total population. The case fatality-rate has also been highest amongst this oldest age-group—30 per cent. as compared with a fatality-rate of only 3 per cent. in the age group 15–34 years. This high incidence and fatality-rate among elderly people constitutes the most significant and original epidemiological observation made in the present epidemic.

The symptomatology in the present outbreak is also somewhat unusual. The clinical picture is described as being that of a general febrile disturbance, often with gastro-intestinal symptoms in addition to the more usual evidences of cerebral involvement. Disturbances of the oculo-motor functions are said to be unusual rather than usual. In agreement with clinical findings the pathologists describe lesions at a higher level than those generally found in this disease: there is involvement of the cortex but no tendency toward special localisation in the basal ganglia or brain stem.

Drinking water appears to have been excluded as a possible cause of the disease. On account of the unusual seasonal incidence it has been recommended that the patients' rooms be screened. At the time of writing there seems to be no evidence that the essential cause or method of spread of epidemic encephalitis is any better understood than in the past.

ALUM TOXOID

Some hitherto unpublished experience with alum toxoid is printed in the bulletin of the Kentucky State board of health for August. In Worcester county, Maryland, 92 coloured, Schick-positive teachers and children were given a single dose of 1 c.cm. of precipitated toxoid. Six to seven weeks later only one of the group, a male teacher, aged 29, gave a positive reaction to the Schick test.

In Virginia 324 Schick-positive children were given one dose each of 0·5 c.cm. alum toxoid containing 12·5 units per c.cm. Six weeks later 94 per cent. of these children were found to be Schick-negative. A single dose of 1 c.cm. of the same toxoid was given to each of 255 Schick-positive children, and six weeks later 96 per cent. of these children were found to be Schick-negative.

A report from Washington county, Maryland, emphasises the absence of serious reactions. Only 2 out of 100 children receiving doses of 0·5 or 1 c.cm. of alum toxoid were absent from school on the day following the injection. In neither case was the reaction considered severe. Among the 98 who were seen in school, 2 children had considerable œdema and a rather large inflamed area at the site of injection. They did not complain of feeling ill but appeared somewhat "toxic." These were the only severe reactions. Many of the children showed "practically no indications" of having received the toxoid.

A study is being conducted at present in ten counties of the State of Kentucky.

PUBLIC HEALTH SERVICES

The Social Worker in the Mental Hospital

The home conditions of the mentally sick are increasingly recognised as an important factor which must be reviewed in assessing the causation of a psychosis, in successful treatment, and in prognosis of the patient's future health. No prognosis is complete if the patient's antecedents are not known, and the most successful recovery is unlikely to continue if home conditions are full of acute difficulties for the previously unstable patient. The social workers attached to the mental hospital have formed an integral part of the organisation of many mental hospitals in America for some years, but the practice of appointing such workers in this country is only proceeding slowly. The work comes under three heads.

(1) There is first the case of the discharged patient. The social worker may ascertain the conditions to which he will return, the likelihood of unemployment or of suitable work, the possibility of a change of occupation if the onset of the psychosis seems in any real way connected with this. She has the opportunity of seeing how far the general principles which the psychiatrist feels should govern the patient's future life can be practised, and of interpreting these in simple homely terms to the relatives. It is possible under the Lunacy Act to aid discharged patients financially, and this proviso is made use of to some extent in order to bridge the gap between return home and restarting work. The Gloucester County and City hospital have in addition a small charity for this purpose. The social worker can make suggestions about the use of such grants. Hitherto these things have been done in a rough-and-ready way by coöperation between the hospital staff and such voluntary organisations as the Mental After-Care Association and the Central Association for Mental Welfare.

(2) Then there is work in ascertaining the patient's history before breakdown, his normal temperamental reactions, the family history. Some hospitals have issued a printed questionnaire, but the answers are seldom definite or full enough to be of great service. In America, on the other hand, these inquiry sheets may be so elaborate as to be difficult to analyse. In the Birmingham group of hospitals it has been found that a psychotic family history has been discovered in 20 per cent., more cases when the social workers have carried out the investigations than when the relatives' own written answers have been accepted. In 1932 the history of 79 out of the 188 cases admitted to the Cheshire mental hospital have been investigated by a social worker, and 342 case-histories have been reviewed by the social worker attached to the Cardiff mental hospital. For such studies to have much value they should be undertaken by one worker with a wide outlook, and access to the replies to a questionnaire. Such information can be better obtained by the social worker than by the medical officer.

(3) The third function is one which is commented upon by the commissioners of the Board of Control in their report on the Devon mental hospital. Attention is drawn to the possibility of the social worker discovering new homes where improved or recovered patients may be boarded out, and thus relieve the hospital accommodation.

Over and above these direct contacts the social worker can help indirectly by bridging the gulf between the troubled minds of the relatives and the little understood hospital régime. She becomes liaison officer to an extent rarely possible for the physician in charge of the patient. This relationship has a further aspect. If a representative of the hospital is willing to come and visit the home the harassed relatives are less secretive with the neighbours about the family grief, and the point of the social workers' questions and the general attitude of inquiry and anxiety to help are likely to be discussed outside the home. Should this happen to any wide extent it must gradually alter the common attitude of mystery and stigma towards mental illness. The London County Council have an organised scheme for the training of social workers in connexion with mental hospitals; one worker at Cardiff had over 900 interviews during 1932, and other local authorities are moving slowly in this direction. At the Leicester City mental hospital senior members of the staff obtained reports of home conditions.

Port Sanitation

At Manchester last year Dr. E. H. Walker found sanitary defects on 357 ships and remedied them on 224. They were generally due to wear and tear, 50 of them in water-closets, and mostly on coasting not foreign-going ships. On 166 ships 654 rats were destroyed; 16 examined were all free of plague. Responsibility for rats ashore falls on the Ship Canal company, not on the authority, and here 1679 were destroyed; there is no statement as to their infection. A cadet was found with malignant scarlet fever on the morning his ship was sailing for the U.S.A., and he was taken to hospital, where he died that morning; the other cadet who slept in the same cabin with him was taken, as a contact, to a sanatorium, but did not develop the disease. For venereal disease there were treated at the Salford municipal centre 36 British, 32 foreign seamen. Of imported food 146 tons were condemned, the chief item being 88 tons of potatoes.

At Bristol Dr. R. H. Parry found sanitary defects on 361 ships, more proportionately on foreign than on British-owned; they were remedied on 355. Rats were destroyed—on ships 1069, ashore 2589; 469 were examined, none found plague-infected. A case of enlarged inguinal glands caused suspicion of plague, contradicted by later clinical developments; 5 rats caught on board that ship were found uninfected. One ship from the River Plate showed many rat indications; after a first fumigation 152 dead rats were found, and 20 after a second; of 42 examined all were uninfected. For venereal disease 195 seamen were treated at the municipal clinic. Of imported provisions 220 tons were condemned, among these 304 mutton carcasses stained a dark yellow-brown, and found to contain arsenic, its source untraced.

On the Tyne Dr. W. E. Harker notes that sanitary defects were found on 560 ships, and that all were remedied. On vessels 4473 rats were destroyed, all examined and found free from plague. No information is available about shore rats. Nor is there a report of the number of seamen seen at local venereal clinics. Of imported food 20 tons were condemned. Among the imports were "Epsom salts, 858 tons."

The Decline in Gonorrhœa

Study of the reports of the various schemes for the treatment of venereal diseases under local authorities reveals a general decline in the number of new cases of gonorrhœa coming up for treatment. Medical officers are naturally cautious about attributing such a decline to a real diminution in the disease, but Dr. B. C. Stevens considers that at Grimsby there must have been a decline in incidence, no other obvious factors having been at work. At Eastbourne the removal of the private waiting-room in connexion with the V.D. clinic is suggested by Dr. W. G. Willoughby as possibly contributing to the lessened attendances; unfortunately plans for a new clinic have had to be abandoned owing to financial stress. The value of follow-up work in persuading defaulters, particularly women, to complete treatment until cured is stressed by Dr. J. Guy in the Edinburgh reports, some 2754 visits having been made by the nurse in this connexion, and over 90 per cent. of defaulting women and children having been induced to return. It is the untreated or incompletely treated woman who is chiefly responsible for the spread of gonorrhœa, and Dr. T. Pierson naturally regards the rising proportion of women to men attending in Plymouth (from 1 to 5 to 1 to 2) as very satisfactory. On the whole, the decline is most marked in the towns; some county districts, e.g., Wilts (Dr. C. E. Tangye), showed an increased gonorrhœal attendance. Dr. T. Gibson reports a comparatively large increase (chiefly in women) in attendances at the new clinic in Wakefield, but he gives good reasons for not regarding it as a true rise in incidence. Any signs, however slight, of a diminution in this disease are worthy of rejoicing, for the more we learn about the pathology of gonococcal infections the more seriously have we come to regard them.

The Format of Reports

Tastes differ, and a selection of M.O.H. reports might form as worthy an object for the collector as, say, one of British lepidoptera. The thrill of capturing an undamaged specimen of the rare Surbiton brimstone; the large clouded yellow of the borough of Hackney; the innumerable different varieties of chalk blue; the meadow brown of Adwick-le-Street, or the peculiar rarity of the plain cabbage white of Thedwastre and Stowmarket might well attract the interest of the connoisseur. In size, colour, binding, and type they range the whole gamut of the printing world, and a good case could be made out for some uniformity, at least in dimensions. Printing is almost without exception in local hands, and it might perhaps increase the cost too much to insist on a rigid conformity, but the medical librarian or collator of such reports would be grateful for a standardised index if for nothing else.

Tuberculosis Reports

THE CHANGED OUTLOOK.—Among the dry but essential tables and statistical returns will flash out now and then an aphoristic gem. In the fourteenth annual report to the Fife and Kinross Joint Sanatorium Board, Dr. William T. Munro, medical superintendent of the Glenlomond Sanatorium, speaks of the changed outlook in regard to pulmonary tuberculosis, as compared with even a decade or so ago. The aim is to get back to the beginnings of disease, i.e., by going to the child who has been infected in a tuberculous family, but who as yet shows no sign of actual disease. Greater efforts must be made to prevent such infection from developing visceral disease later on. The glandular system of such children should receive more attention at the tuberculosis dispensaries, and the observation should be continuous. Modern institutional treatment should aim more and more at overcoming the mechanical factors which interfere with the natura healing of a tuberculous lung. As a means to this end artificial pneumothorax and its allied measures should be more frequently employed.

ACCESS TO THE DISPENSARY.—Some uncertainty exists as to how patients are received at the tuberculosis dispensaries. Is it open to the man-in-the-street who thinks he may have got consumption to walk in without let or hindrance and ask to be examined, or must he present a doctor's card on admission? There is a good table in Dr. W. D. Carruthers's annual report to the Staffordshire, Wolverhampton, and Dudley Joint Committee for Tuberculosis, which shows exactly how patients are sent to the dispensaries in these areas. Thus out of 2698 patients examined at the various dispensaries for the first time in 1932, no less than 1751 (or 64·8 per cent.) were sent by medical practitioners; 263 by the school medical inspectors; and 183 by the health visitors. The remaining 501 (or 18·5 per cent.) are included in a column under the heading "Otherwise," by which it may be inferred that these particular patients came upon the recommendation of fellow-sufferers, friends, or may even have walked in from the street. Seeing that the main object of the dispensary is to prevent tuberculosis among the community, access thereto for the purposes of medical examination should not be made too difficult, though it is preferable that patients should be sent in the first place through their own doctor.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 2ND, 1933

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 4 (last week 8); scarlet fever, 1977; diphtheria, 811; enteric fever, 53; acute pneumonia (primary or influenzal), 389; puerperal fever, 40; puerperal pyrexia, 129; cerebro-spinal fever, 17; acute polio-myelitis, 35; acute polio-encephalitis, 2; encephalitis lethargica, 6; dysentery, 13; ophthalmia neonatorum, 82. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Sept. 5th–6th was as follows: Small-pox, 15 under treatment, 0 under observation (last week 20 and 0 respectively); scarlet fever, 1640; diphtheria, 1475; enteric fever, 12; measles, 455; whooping-cough, 292; puerperal fever, 22 mothers (plus 12 babies); encephalitis lethargica, 254; poliomyelitis, 2; "other diseases," 177. At St. Margaret's Hospital there were 17 babies (plus 8 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox or enteric fever, 11 (4) from measles, 7 (2) from scarlet fever, 14 (3) from whooping-cough, 20 (4) from diphtheria, 105 (19) from diarrhœa and enteritis under two years, and 15 (3) from influenza. The figures in parentheses are those for London itself.

Of the deaths from diarrhœa outside London, 22 were reported from Liverpool, 7 from Leeds, 6 from Hull, 5 each from Sunderland and Leicester, 4 from Birmingham, 3 each from Tynemouth and Nottingham. Measles was fatal in 4 cases at Liverpool. Two deaths from diphtheria were reported from Barnsley, Leeds, Manchester, and West Hartlepool.

The number of stillbirths notified during the week was 261 (corresponding to a rate of 41 per 1000 total births), including 47 in London.

UNIVERSITY OF BRISTOL.—On Friday, Sept. 29th, Sir Hilton Young, Minister of Health, will inaugurate the department of preventive medicine of this university. The ceremony will take place in the Canynge Hall at 12 noon.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Lt.-Comdrs. M. B. Devane, P. J. A. The O'Rourke, W. Flynn, R. R. Baker, E. V. Barnes, R. L. G. Proctor, W. A. Hopkins, and C. B. Nicholson to *President* for course; G. S. Rutherford to *Victory* for R.N.B., Portsmouth; and M. A. Graham-Yooll to *Bideford*.

Surg. Lts. A. N. Forsyth to *Endeavour*, on recommg.; S. K. Foster to *Pembroke* for R.M. Infirmary, Deal; W. Greaves to *Harebell;* E. L. Littler to *Pembroke* for R.N.B., Chatham, and to *Weston;* H. O'Connor to *Ormonde;* D. D. Steel-Perkins to *Vernon;* and P. N. Walker-Taylor to *Dorsetshire* (on relief).

The courses for promotion to Surgeon-Commander, R.N., have been resumed.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lt.-Comdrs. A. E. Christie to *Fermoy*, and H. Parry-Price to *Sutton*.

Surg. Lt.-Comdr. (D). E. D. Collins to *Rodney*.

Surg. Lts. H. A. Lockhart and R. H. Enoch to *Victory* for Haslar Hospital; S. B. Levy to *Iron Duke;* D. W. Bawtree to *Valiant;* D. M. Craig to *Excellent;* and R. D. Bradshaw to *Victory* for R.N.B.

Proby. Surg. Lt. (D) A. B. Bateman to *Vivid* for R.N.B., Devonport.

ARMY MEDICAL SERVICES

The War Office announces that Brevet-Colonel F. D. G. Howell, D.S.O., M.C., Honorary Surgeon to the King, has been appointed (temporarily) Deputy Director-General, Army Medical Services, with effect from Sept. 16th, in succession to Major-General W. R. Blackwell, C.B., C.M.G., Honorary Surgeon to the King. Brevet-Colonel J. W. L. Scott, D.S.O., has been appointed Assistant Director-General, Army Medical Services, in succession to Brevet-Colonel Howell, and will take up the appointment about the end of September.

TERRITORIAL ARMY RESERVE OF OFFICERS

Lt.-Col. G. Mackie, having attained the age limit, retires and retains his rank, with permission to wear the prescribed uniform.

Capt. J. C. Graham, from Active List, to be Capt.

ROYAL ARMY MEDICAL CORPS

Capt. J. A. Chapel retires, receiving a gratuity.

TERRITORIAL ARMY

G. E. O'Riordan to be Lt.

ROYAL AIR FORCE

Dental Branch.—Flight-Lt. J. Twohill is transferred from Class D(ii) to Class D(i).

INDIAN MEDICAL SERVICE

Majs. to be Lt.-Cols.: G. H. Mahony, G. Covell, W. R. Stewart, H. Chand, V. Mahadevan, A. C. L. O'S. Bilderbeck, J. W. Vanreenan, M. Das, J. M. R. Hennessy, H. H. Brown, C. H. N. Baker, and K. R. Rao.

ROYAL ARMY MEDICAL COLLEGE

Col. N. Low, on promotion, has relinquished his appt. as professor at the College, and Lt.-Col. and Bt.-Col. G. S. Wallace has been appointed a professor.

COLONIAL SERVICES

Dr. G. Robinson has been promoted to Senior Pathologist to the Medical Research Institute, Gold Coast.

FIRE AT A TUBERCULOSIS COLONY.—Fire broke out last week at the East Lancashire Tuberculosis Colony for ex-Service men at Barrowmore Hall, near Chester. It is said to have originated in the buildings in which fire-lighters for sale are produced in large numbers, and much damage was done.

CORRESPONDENCE

EUGENICS IN GERMANY

To the Editor of THE LANCET

SIR,—The German Sterilisation Act, of which the translation published in your issue of Sept. 2nd is the first to appear in this country, has apparently been subjected to some misinterpretation in the press comments which followed its announcement at the end of July. In many of these comments, attention has been focused upon the fact that the Act makes it possible for a director of a German punitive institution to take the initiative in recommending the compulsory sterilisation of an inmate. Since German prisons and concentration camps, which are presumably included in the term "punitive institution," contain large numbers of political offenders, it has not unnaturally been remarked that the Act might be held to legalise the sterilisation of persons who disagreed with the policy of Herr Hitler. Careful scrutiny of the Act, however, makes it doubtful if this interpretation is justified. Clause 2 of the Act runs as follows:—

> "Hereditarily ailing in the sense of this law is anyone who suffers from one of the following diseases: (1) congenital feeble-mindedness, (2) schizophrenia, (3) periodic (manic-depressive) insanity, (4) inherited epilepsy, (5) inherited St. Vitus's dance (Huntington's chorea), (6) inherited blindness, (7) inherited deafness, (8) severe inherited physical malformation. Further, anyone suffering from severe alcoholism may be sterilised."

It will be noted that crime is not included in this list. If, therefore, the sense of the Act is governed by this clause, it would seem to follow that the directors of prisons would only be justified in recommending the sterilisation of inmates provided that they exhibited one of the nine conditions specified above. The essential point would appear to be the interpretation of the phrase "hereditarily ailing in the sense of this law is anyone who suffers from . . ." Does this mean "hereditarily ailing in the sense of this law are *only* those persons who suffer from . . ." or does it mean "persons suffering from one of the following diseases may, *among others*, be regarded as hereditarily ailing"? If the phrase is to be interpreted in the first sense, it would be impossible to sterilise a hæmophiliac or a male suffering from polycystic disease of the kidney or hereditary diabetes, or, of course, a criminal; if in the second, these and presumably other groups also might be sterilised. The following suggestion has also been made though, to my knowledge, it has not yet appeared in print. The term "feeble-mindedness" as used in this country has been given a legal definition in the Mental Deficiency Acts, and is strictly applicable only to persons of a relatively pronounced degree of mental deficiency. The corresponding term in German has a much wider connotation and embraces many categories of persons who, in this country, could not be certified as feeble-minded, but would be regarded as "retarded normals." It is not impossible that by Nazi fanatics, persons who do not share their political views might be regarded as feeble-minded in the wide German sense.

Considering the matter impartially, it is, in my opinion, improbable that the German Act was intended by those who drafted it to sanction the sterilisation of criminals, and I have been informed from an unofficial source in Germany that this is the case. But the wording of the Act is slightly ambiguous and the above interpretation is not wholly certain.

It is also worth pointing out that the German Act differs conspicuously from the Bill introduced by Major Church in the House of Commons on July 21st, 1931, and from what English eugenists think desirable or practicable. The English Bill was at pains to make compulsion impossible and included numerous safeguards absent in the German Act—among others, the consent of the spouse or, if the candidate for sterilisation were unmarried, his pa

It is important that this should be

since there is a danger of the general public being led to suppose that Nazi eugenics is the only kind of eugenics.—I am, Sir, yours faithfully,

London, W., Sept. 7th, 1933. C. P. BLACKER.

DENTAL SURGEONS IN THE MEDICAL DIRECTORY

To the Editor of THE LANCET

SIR,—For nine years the Medical Directory has not contained any list of dental surgeons. The discontinuance of this most useful section has deprived both groups of practitioners, perhaps more particularly the doctors, of a readily available and dependable book of reference, and consequently has diminished its value. In these days of increasing coöperation and contact between all branches of our profession it is frequently necessary for doctors, and others, to possess, or have accessible, a reliable record such as the Medical Directory provides. Neither the Medical Register nor the Dentists Register fufills the requirements, while the lack of a combined medical and dental directory is often a hindrance and an inconvenience to doctors in their work.

Possibly the inclusion of the names of dental surgeons was relinquished on account of expense, of the increasing size of the volume, and for other reasons, but even these obstacles are not insuperable. Although the Medical Directory is a private publication, yet by its deserved success it has gained a well-earned and unique place in the esteem of our profession and outside. In consequence a responsibility has devolved upon the owners, of which they may well be proud, both to the profession and to the public at large. It is the hope of some of us that the publishers may favourably consider the subject of this letter and furnish us once again with a medical and dental directory in one volume.

I am, Sir, yours faithfully,

Wimpole-street, W., Sept. 11th, 1933. JOHN FAWCETT.

UNEMPLOYED MEN IN CAMP

To the Editor of THE LANCET

SIR,—The organisers of Grith Fyrd Camps are most grateful for the very appreciative account of their work which appeared in THE LANCET of last week. It may interest your readers to know that the approach has been throughout biological rather than mechanistic. Instead of evolving a scheme and fitting men into it, five of the originators themselves went into camp and made the first rough shelters; they were joined after ten days by the first recruits, and the social organism thus planted has slowly grown to a group of close on fifty. The activities of the men are the natural reactions to the environment of what is in effect a pioneers' camp, and were only prearranged in so far as it was foreseen that men of good capacity—even though they might have spent all their lives in towns—would rise as they have done to the calls made upon them by a primitive environment in which their comfort depends mainly upon their own efforts. No one who visits the camp at Godshill can fail to be impressed by the physical and mental fitness of the men; and their ideas of relative values are found to move gradually from terms of money to terms of usefulness for the practical purposes of a healthy life.

The movement began under the name of "the F.E.B. Scheme," and on March 5th, 1932, you printed a letter from the medical members of its originating group. May I add also that the transitional payment usually assessed at Godshill has now most fortunately been raised to 12s. The most urgent need, in addition to money and live men, is land for further camp sites—either as a gift or buyable in lots of 20 to 40 acres at a very low price.

I am, Sir, yours faithfully,

J. NORMAN GLAISTER,

Sept. 11th, 1933. Hon. Sec., Grith Fyrd Camps.

PANEL AND CONTRACT PRACTICE

Dropping Out of Benefit

As the end of the year approaches the problem of medical benefit for insured persons who then drop out of benefit is coming home to insurance committees and public assistance authorities. Various suggestions have been put forward. These persons have been unemployed so long that they are obviously unable to pay a doctor for private attendance, and some form of contract practice will be needed, preferably one which provides for the continued services of the doctor who was chosen under the Act. If he again becomes an insured person through taking up employment he would not then have to change his doctor again. If nothing is done for them the majority must drift into the hands of public assistance committees, who will provide the services of their district medical officers, free of charge, if and when required. These officers, often themselves insurance practitioners, will thus have on their hands a number of patients who really belong to other practitioners. Their position will be unsatisfactory. Unemployed persons on the list of Dr. A, who lose benefit in December next, may be obliged to obtain the services of Dr. D, acting as district medical officer; when they return to work they will go on Dr. D's list to avoid the trouble of repeated change. This difficulty might be overcome by not permitting district medical officers to undertake insurance work under the Act, or, better still, by opening the work of these officers to any insurance practitioner who wishes to do it. Any registered medical practitioner would then be able to join the panel of the public assistance authority just as he does the insurance panel. A scheme has been worked out by the clerk to the Reading insurance committee which embodies this idea, and is being considered by the public assistance authority. The insured person about to lose medical benefit would be informed that it might be possible to provide him with medical attention by his own doctor if the form supplied is filled up and returned. The form would be checked by the insurance committee and passed to the public assistance committee for examination and decision. If benefit is authorised the patient would receive a special medical card with his doctor's name on it. Drugs and appliances would be ordered on special prescription forms and payment made at capitation rates by the insurance committee from money received from the public assistance committee. The officers of this committee would review each case periodically to make certain there had been no re-entry into insurance. The Reading insurance committee have offered to run this scheme for 12 months without charge: they have the available machinery, and it would be an economy to the town to use it. The scheme seems to have received the approval of the local profession. The decision of the Reading public assistance committee and of the Ministry of Health will be awaited with interest.

"Commercially Minded" or Shackled by Regulations

"Candid Friend" writes: Your contributor returns to the case of the doctor against whom an insured patient brought an unjustified complaint, and is at pains to prove that the complaint was, in fact, unjustified. This was unnecessary. It is common ground that it was unjustified, since it was found to be so by the committee. Everyone will agree also that an unjustified complaint should not be made, either under the insurance regulations or in any other way. But how is it possible to determine whether a complaint is unjustified unless it is investigated? It might conceivably be argued that insured persons should be deprived of the right to have their complaints investigated, but this would leave them with no redress in a case of real neglect, and can hardly be what your contributor would desire. As a matter of fact, the number of complaints investigated by the medical service subcommittees is small, considering that there are nearly 16,000,000 insured persons in England and Wales, and nearly 16,000 panel doctors. According to the annual report of the chief medical officer of the Ministry of Health for the year 1931, the number so investigated in that year was 246, including complaints made by approved societies, and in 73 cases remuneration was withheld from the doctor concerned. In the remaining 173 cases, therefore, either the doctor was exonerated or it was decided that his error was not sufficiently serious to warrant the withholding of remuneration. "It will be seen," he concludes, "that the chances that any particular doctor would have an unjustified charge brought against him were remote."

[True. But when, as shown by "Candid Friend's" figures, the complaint is found to be unjustified, the doctor has no redress against the complainant. He has had to attend the investigation, has been through a very trying ordeal, has been subjected to questioning by persons ignorant of medical procedure, and at the conclusion his only recompense is that he may, if he claims it, be allowed his travelling expenses and a subsistence allowance. In private practice patients hesitate to allege professional neglect or incompetence against a doctor because of the risk of damages being awarded if their statements are untrue; but no one has ever heard of an insured person having to pay one penny for bringing an unjustified complaint against an insurance doctor before the medical service subcommittee.]

NEW HOSPITAL AT BALLYMONEY.—The Duchess of Abercorn recently presided at the opening ceremony of the Robinson Cottage Hospital which has been built and equipped by Mr. Samuel Robinson, of Philadelphia, a native of Ballymoney, Co. Antrim, in memory of his father and mother, at a cost of £50,000. He has also provided a partial endowment. The hospital will accommodate 25 patients.

OBITUARY

JOHN PLAYFAIR, M.D., F.R.C.S. Edin.

EX-PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

Dr. John Playfair, who died at Colinton on Sept. 4th at the age of 84, was probably the oldest practising member of the medical profession in Edinburgh. One of the seven sons of Charles Playfair, of Islabank, Coupar-Angus, he graduated at Edinburgh University in 1872 and then studied in Paris and Vienna. Returning to practice in Edinburgh, he was at first medical officer to the New Town dispensary and then began to pay the special interest to the ailments of children that secured his election to the staff of the Royal Hospital for Sick Children, and his appointment as clinical lecturer on diseases of children in the University. Appropriately enough he was at this time next door neighbour to Dr. John Brown, the author of "Rab and His Friends." In 1876 he was elected a Fellow of the Royal College of Physicians, and in 1904 he succeeded T. S. Houston as president. At the quater-centenary of the Royal College of Surgeons in 1895 he was made an honorary Fellow of that College. Playfair's other main interest lay in insurance work. In 1885 he became chief medical officer to the Century Insurance Company of Edinburgh, a company which was the originator of the permanent type of sickness and accident insurance as opposed to the year-to-year contract. With this type of special insurance he was associated until his death. On the amalgamation of the Century with the Friends Provident Institution in 1918 he was appointed their chief medical officer for Scotland. He was also chief medical officer to the North British and Mercantile Insurance Company in Edinburgh for about 50 years. His opinion on insurance matters was highly valued and he retained his critical acumen in old age. Playfair had an extensive and rather select private practice, which he built up by sheer good character and constancy. He was a gracious and considerate practitioner, unflustered in manner, wise and comprehensive in making a diagnosis. He was strict in prescription of diets and food habits, particularly in cardiac cases, and the results were gratifying. It is said that he was able to carry on his work until within a month of his death.

DR. PLAYFAIR

[Photo E. D. Young

Dr. Playfair's country upbringing was evident in his life-long interest in country sports such as shooting and fishing. He was brought up with horses and greatly regretted the passing of the carriage and pair. He leaves a widow, two daughters, and two sons, one of whom is chief staff officer to the Royal Air Force in India. He will be much missed in Edinburgh, for he was of the quiet order of men wh make friends without effort.

MEDICAL NEWS

Royal Faculty of Physicians and Surgeons of Glasgo

At a meeting held on Sept. 4th Dr. Mohammad Salam Ullah and Dr. Maha Nand Sardana were admitted Fellow of Faculty.

St. Bartholomew's Hospital

The annual dinner for old students of this hospit will be held on Monday, Oct. 2nd, at 7 for 7.30 P.M., i the great hall of the hospital. Lord Horder will be i the chair.

St. Mary's Hospital

A post-graduate course open to all medical practitioners will be held in this hospital from Friday, Sept. 29th to Sunday, Oct. 1st. The annual dinner for past an present students will take place at the Trocader Restaurant, Shaftesbury-avenue, London, W., o Saturday, Sept. 30th, at 7.30 P.M.

London Hospital

A post-graduate course for old students of this hospita will be held from Oct. 11th to 14th. The annual dinne will take place at the Trocadero Restaurant, London, W., on Thursday, Oct. 12th, at 7.30 for 8 P.M., when the chair will be taken by Dr. P. N. Panton, director of the Hale clinical laboratory.

St. George's Hospital

A post-graduate course for old students has been arranged by this hospital, and will be held from midday on Friday, Sept. 29th, till midday on Monday, Oct. 2nd. The inaugural address and prize-giving will take place at 3 P.M. on Oct. 2nd in the board room, when an address on Fashion in Medicine will be given by Dr. James Collier. The annual dinner will be held on the same evening at 7.15 for 7.45 P.M., when Dr. Henry Robinson will be in the chair. The secretaries for the dinner are Mr. B. H. Burns and Dr. G. W. Mitchell.

Middlesex Hospital Medical School

The annual prize distribution of this school will take place on Tuesday, Oct. 3rd, at 3 P.M., at the Queen's Hall, Langham-place, London, W. The introductory address will be given by Prof. E. C. Dodds, director of the Courtauld Institute of Biochemistry, who will speak on diet, exercise, and weight. The prizes will be presented by Sir Holburt Waring, president of the Royal College of Surgeons of England. The annual dinner will be held the same evening at the Savoy Hotel (Embankment entrance), London, W.C., at 7.30 P.M.

William Mackenzie Medal

The William Mackenzie medal will this year be awarded to Prof. Jules Gonin, of Lausanne, in recognition of his valuable contributions to ophthalmology, especially those bearing on the treatment of detachment of the retina. The presentation will be made in the hall of the Royal Faculty of Physicians and Surgeons, Glasgow, on Friday, Oct. 13th, at 8.30 P.M., when Prof. Gonin will deliver the William Mackenzie memorial lecture on the evolution of ideas concerning retinal detachment within the last five years.

London School of Hygiene and Tropical Medicine

The nine months' course of study for the diploma in public health begins at this school on Oct. 2nd. The Fishmongers' Company studentship, entitling the holder to free tuition for the whole course, is open for competition among European students who hold a medical qualification registrable with the General Medical Council. The subject of the examination, which will be held at the school on Sept. 20th–21st, is hygiene, within the scope of the London third M.B. Applications must be received by the secretary of the school (Keppel-street, W.C. 1) by Sept. 16th.

ugenics Society

After Sept. 25th the address of this society will be , Eccleston-square, London, S.W. 1.

laries at Bradford

The finance and general purposes committee of the adford city council have approved the recommendations the health committee increasing the salaries of 12 dical officers. The total amount of the increases is 90. The committee also decided to reconsider their cision not to approve the recommendations of the health mmittee that, as from April 1st, 1933, the salaries of dical officers shall be fixed in accordance with the scale the British Medical Association, less 10 per cent. nporary reduction.

ndon Hospital Memorial to Lord Knutsford

At the quarterly court of governors of the London spital last week it was stated that Sir Edwin Lutyens s, as a labour of love, designed a commemorative tablet the late Lord Knutsford, to be placed in the main trance hall. The inscription is as follows:—

> SYDNEY GEORGE, Second Viscount KNUTSFORD.
> Chairman of this Hospital from 1896 to 1931.
>
> Friend of all manner of men he will be remembered for his nerous compassion for the sick and distressed. To these he ve the best of his powers. Rich beyond most men in the ts of energy, courage and humour, he drew others to give th a sympathy and generosity akin to his own. Through m the Hospital was largely rebuilt and equipped to serve nerations yet to come. Above all he inspired it in every rt with his own spirit of love and service. He died in the spital on July 27th, 1931, aged 76 years.
>
> "Fulfil ye my going that ye be likeminded having the same ve, being of one accord, of one mind."

Medical Diary

Information to be included in this column should reach us proper form on Tuesday, and cannot appear if it reaches later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 18th, to SATURDAY, Sept. 23rd.—BETHLEM ROYAL HOSPITAL, Monk's Orchard, Eden Park, Beckenham. Course in Psychological Medicine, Tues. and Frid., 11 A.M.—WESTMINSTER HOSPITAL, S.W. Course in Medicine and Surgery (for men graduates only). All day.—Individual clinics in almost all branches of medicine and surgery are available daily by special arrangement with the Fellowship of Medicine.

Appointments

EACOCK, J. ROYDON, B.Chir. Camb., F.R.C.S. Eng., has been appointed Assistant Surgeon, Throat, Nose and Ear Hospital, Golden-square.

ETERKIN, G. A. GRANT, M.B., B.Ch. Edin., Asst. Physician to the Skin Department, Royal Infirmary, Edinburgh.

UINLAN, J. M., M.B., Ch.B. N.U.I., Certifying Surgeon under the Factory and Workshop Acts for the Southport District, Lancaster.

OSS, J. COSBIE, Ch.M. Liverp., F.R.C.S. Eng., Honorary Asst. Surgeon to the Liverpool Royal Infirmary.

ILSON, J. G., M.D., B.S. Lond., M.R.C.P. Lond., D.P.H., M.O.H. for Cardiff.

Vacancies

For further information refer to the advertisement columns

ltrincham General Hospital.—Jun. H.S. At rate of £120.
ath, Royal United Hospital.—Sen. H.S. At rate of £175.
irmingham, St Chad's Hospital.—Res. M.O. £100.
ancer Hospital, Fulham-road, S.W.—Asst. Radiologist. £350.
ardiff Royal Infirmary.—Res. Reg. £100. H.P.'s and H.S.'s. Each at rate of £50. Also Cas. Surg. O. At rate of £75.
unedin, New Zealand, Otago Hospital Board.—Sen. Res. M.O. £500.
dinburgh Hospital for Crippled Children, Fairmilehead.—Res. Surg. O. £350.
velina Hospital for Sick Children, Southwark, S.E.—H.P. At rate of £120.
ospital for Sick Children, Great Ormond-street, W.C.—H.P. and H.S. Each at rate of £100.
ndia, Bengal and North Western Railway.—M.O. Rs.750.
nfants Hospital, Vincent-square, Westminster, S.W.—H.P. £75.
leworth, West Middlesex County Hospital.—Part-time Visiting Pathologist.. 3 gns. per session.
Lancaster, County Mental Hospital.—Asst. M.O. £500.
Leeds City.—Asst. M.O.H. for Maternity and Child Welfare, £500.
Leeds, Killingbeck Sanatorium.—Asst. Res. M.O. £250.
Liverpool Royal Babies Hospital, Woolton.—Res. M.O. £90.
London Jewis [illegible] *E.*—Hon. Asst. Surgeon.
London Lock [illegible]—Surg. Reg. £100.
Manchester, [illegible] [illegible].O. and H.S. At rate of £150 and £100 respectively.
Middlesex County Council.—Two Res. Asst. M.O.'s. £400.
Mildmay Mission Hospital, Austin-street, Bethnal Green, E.—Hon. Asst. Gynæcologist.
National Hospital, Queen-square, W.C.—Asst. Pathologist. £250.
Newcastle-upon-Tyne, Hospital for Sick Children.—H.P., Sen. and Jun. H.S.'s. Each at rate of £100.
Newcastle-upon-Tyne, Royal Victoria Infirmary.—Sen. Surg. O. £200.
Oxford, The Warneford.—Jun. M.O. £300.
Princess Beatrice Hospital, Richmond-road, Earl's-court, S.W.—Res. M.O. At rate of £110.
Queen's Hospital for Children, Hackney-road, E.—H.P. and Cas. O. Each at rate of £100. Also Asst. Surgeon.
Radium Institute, Riding House-street, W.—H.S. At rate of £150.
Royal Chest Hospital, City-road, E.C.—Physician to Out-patients.
Royal Free Hospital, Gray's Inn-road, W.C.—Two Asst. M.O.'s. Each £350. Also Res. Cas. O. £150.
Royal London Ophthalmic H[illegible]—Pathologist and Curator. £200. [illegible] £150.
Royal Waterloo Hospital for [illegible], *Waterloo-road, S.E.*—Hon. Surg. Reg.
St. Albans, Hill End Hospital.—Second Asst. M.O. £500.
St. John's Hospital, Lewisham, S.E.—Res. M.O. £200.
St. Leonards-on-Sea, Buchanan Hospital.—Sen. and Jun. H.S.'s. At rate of £175 and £125 respectively.
St. Mary's Hospital, W.—Cas. H.S. At rate of £100.
South London Hospital for Women, Clapham Common, S.W.—H.P. and H.S. Each at rate of £100.
Swindon, Great Western Railway Medical Fund Society Hospital. H.S. At rate of £200.
Warrington, County Mental Hospital, Winwick.—Asst. M.O. £500.
Watford and District Peace Memorial Hospital.—Res. Surg. O. At rate of £150.
Weir Hospital, Grove-road, Balham, S.W.—Jun. Res. M.O. £150.
West Bromwich and District General Hospital.—Cas. H.S. At rate of £200.
West End Hospital for Nervous Diseases, Gloucester-gate, Regent's Park, N.W.—Jun. H.P. At rate of £100.
Western Ophthalmic Hospital, Marylebone-road, N.W.—Hon. Asst. Surgeon. Also Jun. Res. H.S. At rate of £100.
Westminster Hospital Annexe, 66, Fitzjohn's-avenue, Hampstead, N.W.—Res. M.O. £200.
Wolverhampton, New Cross Hospital.—Asst. Res. M.O. £200.
Wolverhampton Royal Hospital.—H.P. At rate of £125.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at St. Helens (Lancaster), Pwllheli (Caernarvon), Portobello (Mid Lothian), and Duffield (Derby).

Births, Marriages, and Deaths

BIRTHS

GOUGH.—On Sept. 6th, at Watford, the wife of A. Staveley Gough, F.R.C.S., of a daughter.

JAUCH.—On Sept. 7th, at Grantham, the wife of F. J. Jauch, F.R.C.S., of a daughter.

TAYLOR.—On Sept. 9th, at Foxley-lane, Purley, the wife of Dr. C. E. Taylor, of a son.

WAKELEY.—On Sept. 8th, at Welwyn Garden City, Herts, the wife of Dr. Leslie S. P. Wakeley, of a son.

MARRIAGES

MACNAB—STEPHENSON.—On Sept. 5th, in London, G. H. Macnab, M.B., Ch.B., of Colinton, Mid Lothian, to Juliette Audrey Stephenson, eldest daughter of Mr. and Mrs. Rowland Macdonald Stephenson, Hutton-place, Hutton, Essex.

ROBERTS—BLOOD.—On Sept. 7th, at Woodchurch Parish Church, Owen W. Roberts, M.D., M.S., F.R.C.S., to Winifred Eileen, daughter of Col. and Mrs. F. W. Blood, Birkenhead.

DEATHS

BRODIE.—On Sept. 9th, at Fernhill, Wootton Bridge, I.W., Major Charles Gordon Brodie, M.C., F.R.C.S., aged 73.

PLAYFAIR.—On Sept. 4th, suddenly, at Colinton, John Playfair, M.D., F.R.C.P.E., and Hon. F.R.C.S.E., of Melville-crescent, Edinburgh.

ROOD.—On Sept. 10th, 1933, suddenly, at 109, Clarence Gate-gardens, N.W.1, Felix Stephen Rood, of 39, Harley-street.

ROSS.—On Sept. 3rd, in London, Colonel N. H. Ross, late R.A.M.C.

SMITH.—On Sept. 4th, at Worthing, Alfred Egerton Manners Smith, M.R.C.S., aged 73.

WAY.—On Sept. 4th, at a nursing-home, Southsea, J. H. Frederick Way, M.R.C.S., aged 65.

WRIGHT.—On Sept. 6th, suddenly, at West Cliff, Eastbourne, George Cornelius William Wright, M.D., M.R.C.S., L.R.C.P.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

THE PHILOSOPHY OF TREATMENT

By E. H. R. Altounyan, *M.C.*, M.D.
ASSISTANT SURGEON TO THE ALTOUNYAN HOSPITAL, ALEPPO

My title has been chosen because it touches on what I believe to be at the moment the cardinal weakness of our profession. A horrid metamorphosis seems to occur when the medical student enters upon practice. For five long years or more he has been marching surefooted with gallant comrades along the macadam road of anatomy, physiology, and pathology, following the course of artery and nerve, learning the chemistry of digestion, studying the changes in tissue under stress, with fact and theory, known and unknown, clearly defined. Then suddenly the road ends and those surefooted ranks are transformed into flocks of frightened fowl scattering over the marsh of general practice, clucking out nostrums and squawking in competitive panic on a thousand different notes. Can this shocking spectacle be entirely the result of following that famous precept: "treat the patient and not the disease"? Can this really excuse the multitudinous recipes for the same ailment? I think not. For whenever disease has been mastered it is found that—despite that avuncular maxim—uniformity of treatment rules successfully a thousand patients at a time. Swayed by fashion, stampeded by competition, we shillyshally between the bread poultice of our forefathers and the vaccine of an age to come, so that the bystanders are driven to exclaim: "What in the name of Hippocrates are they up to?" One thing is certain. We do not know ourselves.

For my own part I state with the utmost assurance —defiance if you will—that we stand before the public to-day as purveyors of facts about the body.

Let us consider for a moment the patient's point of view. Whether he be suffering from over-smoking, a stone in the kidney, or unrequited love, he comes to us, as to professed experts in bodily ailments, to be cured or—if that is not possible—to know the true condition of his economy in so far as we know it. This is my thesis—though, as I write, I see again the picture of an aged oriental crouched on his bed who raises a lean forefinger and exclaims: "Oh Doctor, if there is anything the matter, for the sake of Allah, tell it me not." Heaven be praised for the enchanting diversity of its creatures.

Use of Particular Remedies

As a rule then, the patient wants to be cured—and let us assume first that we can cure him. He has, for instance, a fractured femur. Surely here there can be no problem save the mechanical one of alignment and fixation. And yet, what answer do we give? One of us produces splints, bandages, and rolls of the most expensive cotton-wool; another, plaster-of-Paris; another, liking blood and complications, sets his whole staff to work at boiling steel plates; while his rival mutters something about grafts and beef-bone pegs. And yet fractures have occurred since the beginning of bone life, and we live in an age whose fierce attack on mechanical problems is well-nigh incandescent. And yet—and to make matters worse—this particular problem has actually been solved once and for all by skeletal traction some twenty years ago.

This then is my first and simplest example—the case where treatment is at fault not because we can't know or don't know, but simply because we cling in a hazy way to the magic of diversity.

Now let us take another instance of the treatment *of a known and curable disease*—peptic ulcer. Here we have tragi-comedy bordering on farce; for it seems at present as if the unfortunate patient must himself decide—and his very fate hangs on it—whether he shall apply to Dr. A, who, backed by the authority of the heaviest income-tax payers of the profession, will remove two-thirds of his stomach in order to save him from certain death, or to Dr. B, who prescribes wholesale the ghoulish diet of bismuth and olive oil. Yet here is a known and established disease. We can see the ulcer, we can almost hear it drip, and we have had, in all conscience, enough statistics of the opposing schools of treatment to enable us to form a judgment. Nevertheless, the patient of to-day will find it difficult to discover an adviser who will not express himself as partial either to medicine or surgery, as though he were discussing the respective merits of beef and mutton. The actual controversy is irrelevant; I would merely insist that we seem to have failed in our duty to the public when we allow ourselves to become partisans. One cannot help wondering how much of the bias is due to sheer inability to assess scientific evidence and how much to the fact that money considerations take the field. On the one hand some of our most expensive and lucrative medical nursing-homes are maintained by ulcer patients; on the other hand the gastric surgeon claims for an intricate and technically very interesting operation a not uninteresting fee.

Use of General Methods of Treatment

So far we have been on firm ground. Who can deny that the profession as a whole lags pitiably behind in its application of established discoveries; who can doubt that the bias of specialism turns often to the detriment of the sufferer? But now we must launch out into the blue. By far the largest part of our work has to do with diseases in which time, rest, and warmth are the sole factors in the treatment.

Rest and warmth have already been prescribed by the home circle, and we are called in to give the assurance of the expert that time will do the rest.

What happens? At first all goes well. The patient is questioned and examined with meticulous care. Advice is given as to food and drink, the temperature of the room, and the probable duration of the disease. So far all is above board. And then with pantomimic suddenness magic enters. In the room voices are hushed, the doctor takes out a pad of peculiar paper and the family follows anxiously the scratching of the professional pen. Mumbo Jumbo sits enthroned: the prescription is being written. Rest, warmth, diet; unalarming prognosis, simple home remedies are not enough. Like a fool's cap crowning the scene comes the mysterious formula, to be got as often as not only at a certain pharmacy, conveyed in writing cunningly illegible to all but the fellow conspirator. Thus do we, forsaking honesty, grasp at opportunity backed by tradition and a hundred arguments; thus do we seek to maintain our hold, using dubious means and reaping the advantage of a false association.

It is because I believe in drugs that I condemn this practice as intolerable; it is because I am proud of our art that I consider its misuse a prostitution. I shall be told that the public expects it. The public has expected many things which we have not given it. There was time when men, alarmed by fever, estimated the skill of a doctor by his ability to prescribe a febrifuge (still earlier was it not a purge?). Our all too willing associates, the manufacturers of synthetic preparations, promptly produced a truly appalling list of these dangerous drugs. Then suddenly—one fine morning as it were—some bold person suggested that we might tell our patients that fever was beneficial, a sign even that the body was doing its best. The public was startled, wobbled for a year or two, then bowed with a sigh to the new decree. It is just because our position is so overwhelmingly strong that I consider humbug—whatever the excuse—to be intolerable. It is a significant fact that when a doctor treats his family—still more when he treats himself—prescriptions costing solid cash do not somehow figure so prominently; and I suspect that the laity is becoming aware of it.

To sum up this aspect of my subject—I maintain that in by far the greater number of our cases we are asked in for diagnosis, prognosis, and simple advice, and that our patients are quite prepared to consider that they have had their money's worth without being asked to contribute to the pharmacist next door.

Chronic Disease

Some of us more especially have to treat those suffering from some chronic non-fatal disability for which no cure is known. Weeks, even months, may have to pass in examination and diagnostic treatment in which the prescribing of drugs of known and well-tried action certainly plays an important and essential rôle, but finally the day must come when we are faced with a patient who has appealed to us in vain.

Sterility in women is perhaps one of the most distressing instances of this kind. I should have thought that our course of action was obvious, yet I have recently seen it seriously advocated in the medical press that the husband should on no account be examined lest, finding that he is at fault and thereby annihilating hope, the result might be disastrous and lead even to suicide. Such a view seems to me to represent the acme of wrongheadedness. Such a doctor, it appears, would condemn without hesitation a woman to undergo a series of expensive and unpleasant procedures, including even a major operation, rather than oblige her to face the facts and meet the situation squarely. If suicide is really a risk in such a case it is surely one that is not worth considering. If the inevitable is too much for such a person, then the sooner he or she disappears from the scene the better for all concerned.

When at last we are obliged to pronounce on the chronic incurable we must not only destroy all hope of cure at our own hands, but also—without disloyalty to our colleagues—discourage the patient from seeking it elsewhere. No one who has lost an eye pesters the oculist for a new one. If our particular patient is not made to feel that continuance of any form of treatment is as absurd as that, we have failed to render the only service that was required of us.

The Neuroses

The question is not so simple when we come to discuss the neurotic. I mean by that term those who, finding that life is too much for them, have been drawn to take refuge in the contemplation of their bodily functions. Such come to us primarily for the sympathy one expects from a sharer of the same hobby. Fortunately (for both parties) there is no diagnosis more hazardous or difficult to establish than that of the neuroses. Fortunately, I say, for much time must be consumed while the inevitable and expensive examinations take place so necessary to eliminate a lesion of the brain, the hidden cancer, or an obscure focus of infection. Even so, sooner or later the day arrives when the answer must be given. Many of these unfortunates show on their abdomens the scars of incisions, doubtless admirably devised. Many have travelled round the world seeking sun, seeking baths, seeking more and yet more physicians; all have their pocket-books stuffed with well-creased prescriptions. Well, and what shall we do? Do I hear someone whisper: psycho-analysis? Why not? It is or was a magic word, and the treatment is at least carried out on a scientific basis. Our job as humdrum practitioners is over. Wrapped in the majesty of all the findings of the laboratory and clinic we can tell such a one that the trouble lies in his own fat head, and that unless he wishes to find himself in an asylum he had better set to work and—sail a boat!

Of course I know there is the old lady—bless her!—with her lapdog and comfortable balance in the bank, and that clever doctor who does do her such a lot of good with his bright breezy bi-weekly visits and funny stories. Many a stout family has been reared, many a good car kept on just such a practice. But I suggest that these gentlemen trading on personality, exploiting jolly good fellowship, blowing like a great healing wind through the sick room, these, I say, should be given in addition to their M.D. a special diploma, just to distinguish them from—us.

The Hard Truth

But how should one treat those afflicted with necessarily fatal disease? Palliation of pain, of course, but what else? There seems to be an extraordinary idea abroad that human beings are immortal until suddenly smitten down by the ruthless doctor. Had we the knowledge to predict the exact moment any one of our patients must die, I admit that such knowledge should best be locked up in our hearts. But as none of us can foretell even roughly the moment of death we are simply faced with this proposition: a person is found to be afflicted with a disease which he will never get rid of, a disease moreover which will probably curtail his life—always supposing that this is not done for him by a passing car. Can there be any doubt that the sooner we lay these facts before him the better we shall be fulfilling our duty? Then and only then, freed from gnawing anxiety and ineffectual striving, can he look to his business and set his house in order, making the most of the precious moments that remain. And yet I have heard friends successfully persuade the doctor to hide the truth and compel the condemned to fritter away his time, and the money which he might leave to his dependents, in consulting one physician after another, seeking the unattainable. Does gloom necessarily cloud over such a man when he knows the truth? The cancer wing of the Middlesex Hospital is a sufficient answer to such a question.

I know of one circumstance and only one when a doctor is justified in hiding the truth from his patient—and that is when he does not know it. I am thinking more particularly of those acute illnesses when the patient is in great distress and the outcome is utterly uncertain. Even here it is an imbecile policy that makes the medical attendant assume the mask of inane bonhomie and hearty assurance while behind the door his face droops into the classic lines of self-excusing gloom—as though the patient, say in acute pneumonia, fighting for breath, had not a faint inkling that his life was in danger. What I should want my medicine man to tell me at such a time is that I have a jolly poor chance of pulling through, but I may as well go on breathing while I can. That at least is a statement of fact, and—believe me—facts alone count when in extremis.

And then we come to the death-bed scene when the house is hushed and the relatives flutter about distracted with grief, and the doctor is called in to confirm the verdict. Is this the time for magic and mummery, for the hurried writing of yet another prescription, for the injection of this or that? The man is dying: facing reality with every fibre of his body. He can excuse the relatives frightened by death, sorrowing at impending loss, but surely he can look to his doctor, familiar with death and not bound by emotional ties, to stand by and assure him that what is happening is a normal process, normal since the beginning of time.

Remedies which are not Established

I must at this point register an emphatic protest against the great combines of therapeutic products which at the moment form the greatest bar to sanity in treatment. These firms are deluging the world with new products, many of which have as their sole claim to consideration the fact that they do no obvious and immediate harm. Drug upon drug after trial on three guinea-pigs and the lab. boy is confidently recommended for our use; and we, poor fools that we are, afraid of falling behind the times, forgetting the solid training of our long early years, prescribe them recklessly for a week or two

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Let us consider for a moment the patient's point of view. Whether he be suffering from over-smoking, a stone in the kidney, or unrequited love, he comes to us, as to professed experts in bodily ailments, to be cured or—if that is not possible—to know the true condition of his economy in so far as we know it. This is my thesis—though, as I write, I see again the picture of an aged oriental crouched on his bed who raises a lean forefinger and exclaims: "Oh Doctor, if there is anything the matter, for the sake of Allah, tell it me not." Heaven be praised for the enchanting diversity of its creatures.

Use of Particular Remedies

As a rule then, the patient wants to be cured—and let us assume first that we can cure him. He has, for instance, a fractured femur. Surely here there can be no problem save the mechanical one of alignment and fixation. And yet, what answer do we give? One of us produces splints, bandages, and rolls of the most expensive cotton-wool; another, plaster-of-Paris; another, liking blood and complications, sets his whole staff to work at boiling steel plates; while his rival mutters something about grafts and beef-bone pegs. And yet fractures have occurred since the beginning of bone life, and we live in an age whose fierce attack on mechanical problems is well-nigh incandescent. And yet—and to make matters worse—this particular problem has actually been solved once and for all by skeletal traction some twenty years ago.

This then is my first and simplest example—the case where treatment is at fault not because we can't know or don't know, but simply because we cling in a hazy way to the magic of diversity.

Now let us take another instance of the treatment of a known and curable disease—peptic ulcer. Here we have tragi-comedy bordering on farce; for it seems at present as if the unfortunate patient must himself decide—and his very fate hangs on it—whether he shall apply to Dr. A, who, backed by the authority of the heaviest income-tax payers of the profession, will remove two-thirds of his stomach in order to save him from certain death, or to Dr. B, who prescribes wholesale the ghoulish diet of bismuth and olive oil. Yet here is a known and established disease. We can see the ulcer, we can almost hear it drip, and we have had, in all conscience, enough statistics of the opposing schools of treatment to enable us to form a judgment. Nevertheless, the patient of to-day will find it difficult to discover an adviser who will not express himself as partial either to medicine or surgery, as though he were discussing the respective merits of beef and mutton. The actual controversy is irrelevant; I would merely insist that we seem to have failed in our duty to the public when we allow ourselves to become partisans. One cannot help wondering how much of the bias is due to sheer inability to assess scientific evidence and how much to the fact that money considerations take the field. On the one hand some of our most expensive and lucrative medical nursing-homes are maintained by ulcer patients; on the other hand the gastric surgeon claims for an intricate and technically very interesting operation a not uninteresting fee.

Use of General Methods of Treatment

So far we have been on firm ground. Who can deny that the profession as a whole lags pitiably behind in its application of established discoveries; who can doubt that the bias of specialism turns often to the detriment of the sufferer? But now we must launch out into the blue. By far the largest part of our work has to do with diseases in which time, rest, and warmth are the sole factors in the treatment.

Rest and warmth have already been prescribed by the home circle, and we are called in to give the assurance of the expert that time will do the rest.

What happens? At first all goes well. The patient is questioned and examined with meticulous care. Advice is given as to food and drink, the temperature of the room, and the probable duration of the disease. So far all is above board. And then with pantomimic suddenness magic enters. In the room voices are hushed, the doctor takes out a pad of peculiar paper and the family follows anxiously the scratching of the professional pen. Mumbo Jumbo sits enthroned: the prescription is being written. Rest, warmth, diet; unalarming prognosis, simple home remedies are not enough. Like a fool's cap crowning the scene comes the mysterious formula, to be got as often as not only at a certain pharmacy, conveyed in writing cunningly illegible to all but the fellow conspirator. Thus do we, forsaking honesty, grasp at opportunity backed by tradition and a hundred arguments; thus do we seek to maintain our hold, using dubious means and reaping the advantage of a false association.

It is because I believe in drugs that I condemn this practice as intolerable; it is because I am proud of our art that I consider its misuse a prostitution. I shall be told that the public expects it. The public has expected many things which we *have not* given it. There was time when men, alarmed by fever, estimated the skill of a doctor by his ability to prescribe a febrifuge (still earlier was it not a purge?). Our all too willing associates, the manufacturers of synthetic preparations, promptly produced a truly appalling list of these dangerous drugs. Then suddenly—one fine morning as it were—some bold person suggested that we might tell our patients that fever was beneficial, a sign even that the body was doing its best. The public was startled, wobbled for a year or two, then bowed with a sigh to the new decree. It is just because our position is so overwhelmingly strong that I consider humbug—whatever the excuse—to be intolerable. It is a significant fact that when a doctor treats his family—still more when he treats himself—prescriptions costing solid cash do not somehow figure so prominently; and I suspect that the laity is becoming aware of it.

To sum up this aspect of my subject—I maintain that in by far the greater number of our cases we are asked in for diagnosis, prognosis, and simple advice, and that our patients are quite prepared to consider that they have had their money's worth without being asked to contribute to the pharmacist next door.

Chronic Disease

Some of us more especially have to treat those suffering from some chronic non-fatal disability for which no cure is known. Weeks, even months, may have to pass in examination and diagnostic treatment in which the prescribing of drugs of known and well-tried action certainly plays an important and essential rôle, but finally the day must come when we are faced with a patient who has appealed to us in vain.

Sterility in women is perhaps one of the most distressing instances of this kind. I should have thought that our course of action was obvious, yet I have recently seen it seriously advocated in the medical press that the husband should on no account be examined lest, finding that he is at fault and thereby annihilating hope, the result might be disastrous and lead even to suicide. Such a view seems to me to represent the acme of wrongheadedness. Such a doctor, it appears, would condemn without hesitation a woman to undergo a series of expensive and unpleasant procedures, including even a major operation, rather than oblige her to face the facts and meet the situation squarely. If suicide is really a risk in such a case it is surely one that is not worth considering. If the inevitable is too much for such a person, then the sooner he or she disappears from the scene the better for all concerned.

When at last we are obliged to pronounce on the chronic incurable we must not only destroy all hope of cure at our own hands, but also—without disloyalty to our colleagues—discourage the patient from seeking it elsewhere. No one who has lost an eye pesters the oculist for a new one. If our particular patient is not made to feel that continuance of any form of treatment is as absurd as that, we have failed to render the only service that was required of us.

The Neuroses

The question is not so simple when we come to discuss the neurotic. I mean by that term those who, finding that life is too much for them, have been drawn to take refuge in the contemplation of their bodily functions. Such come to us primarily for the sympathy one expects from a sharer of the same hobby. Fortunately (for both parties) there is no diagnosis more hazardous or difficult to establish than that of the neuroses. Fortunately, I say, for much time must be consumed while the inevitable and expensive examinations take place so necessary to eliminate a lesion of the brain, the hidden cancer, or an obscure focus of infection. Even so, sooner or later the day arrives when the answer must be given. Many of these unfortunates show on their abdomens the scars of incisions, doubtless admirably devised. Many have travelled round the world seeking sun, seeking baths, seeking more and yet more physicians; all have their pocket-books stuffed with well-creased prescriptions. Well, and what shall we do? Do I hear someone whisper: psycho-analysis? Why not? It is or was a magic word, and the treatment is at least carried out on a scientific basis. Our job as humdrum practitioners is over. Wrapped in the majesty of all the findings of the laboratory and clinic we can tell such a one that the trouble lies in his own fat head, and that unless he wishes to find himself in an asylum he had better set to work and—sail a boat!

Of course I know there is the old lady—bless her!—with her lapdog and comfortable balance in the bank, and that clever doctor who does do her such a lot of good with his bright breezy bi-weekly visits and funny stories. Many a stout family has been reared, many a good car kept on just such a practice. But I suggest that these gentlemen trading on personality, exploiting jolly good fellowship, blowing like a great healing wind through the sick room, these, I say, should be given in addition to their M.D. a special diploma, just to distinguish them from—us.

The Hard Truth

But how should one treat those afflicted with necessarily fatal disease? Palliation of pain, of course, but what else? There seems to be an extraordinary idea abroad that human beings are immortal until suddenly smitten down by the ruthless doctor. Had we the knowledge to predict the exact moment any one of our patients must die, I admit that such knowledge should best be locked up in our hearts. But as none of us can foretell even roughly the moment of death we are simply faced with this proposition: a person is found to be afflicted with a disease which he will never get rid of, a disease moreover which will probably curtail his life—always supposing that this is not done for him by a passing car. Can there be any doubt that the sooner we lay these facts before him the better we shall be fulfilling our duty? Then and only then, freed from gnawing anxiety and ineffectual striving, can he look to his business and set his house in order, making the most of the precious moments that remain. And yet I have heard friends successfully persuade the doctor to hide the truth and compel the condemned to fritter away his time, and the money which he might leave to his dependents, in consulting one physician after another, seeking the unattainable. Does gloom necessarily cloud over such a man when he knows the truth? The cancer wing of the Middlesex Hospital is a sufficient answer to such a question.

I know of one circumstance and only one when a doctor is justified in hiding the truth from his patient—and that is when he does not know it. I am thinking more particularly of those acute illnesses when the patient is in great distress and the outcome is utterly uncertain. Even here it is an imbecile policy that makes the medical attendant assume the mask of inane bonhomie and hearty assurance while behind the door his face droops into the classic lines of self-excusing gloom—as though the patient, say in acute pneumonia, fighting for breath, had not a faint inkling that his life was in danger. What I should want my medicine man to tell me at such a time is that I have a jolly poor chance of pulling through, but I may as well go on breathing while I can. That at least is a statement of fact, and—believe me—facts alone count when in extremis.

And then we come to the death-bed scene when the house is hushed and the relatives flutter about distracted with grief, and the doctor is called in to confirm the verdict. Is this the time for magic and mummery, for the hurried writing of yet another prescription, for the injection of this or that? The man is dying: facing reality with every fibre of his body. He can excuse the relatives frightened by death, sorrowing at impending loss, but surely he can look to his doctor, familiar with death and not bound by emotional ties, to stand by and assure him that what is happening is a normal process, normal since the beginning of time.

Remedies which are not Established

I must at this point register an emphatic protest against the great combines of therapeutic products which at the moment form the greatest bar to sanity in treatment. These firms are deluging the world with new products, many of which have as their sole claim to consideration the fact that they do no obvious and immediate harm. Drug upon drug after trial on three guinea-pigs and the lab. boy is confidently recommended for our use; and we, poor fools that we are, afraid of falling behind the times, forgetting the solid training of our long early years, prescribe them recklessly for a week or two until the next traveller comes by bringing in new gay-coloured wares. Buried in the rubbish there lurks no doubt many a valuable compound; but who can stay to assay, who can take time to prove its worth?

And yet by a determined effort doctors could call the tune of the manufacturers.

Honesty and its Application

But enough or too much of destructive criticism. Let me restate my case. We stand as professed purveyors of facts concerning the functions of the human body. Where no particular treatment is required none should be given. Where it is indicated we should make certain of every agent that we use, so that whether we fail or succeed at least we learn. Specialism means bias often to the detriment of the patient, but by far the greatest obstacle to honest dealing is the failure to realise what our patients really want from us. Of practical measures I have suggested a concerted stand against drug combines. Still more important to my mind is the need for a complete dissociation of any particular treatment from a corresponding pecuniary reward. I am convinced that some form of universal State medicine would, whatever its disadvantages, cut right at the heart of the problems I have been discussing. I think that all treatment by suggestion must be abandoned. Legitimate in psychiatry, elsewhere it infallibly retards the advancement of our science. Even when successful, the success is bought at the loss of our self-esteem; when it fails it drives our indignant patients straight into the power of the empirics. We must abandon that triple rôle of wizard, father confessor, and friend that has in some measure been thrust upon us. We must fling down the barriers of personal reserve.

In conclusion let us consider whether even under existing conditions we cannot do something to raise medicine to its rightful place among the sciences. We have everything in our favour, but we are apt to mistrust the fundamental wisdom and common sense of common man. The fear of suffering and disability—the strongest single force in life—impels men to seek our aid. We have chosen the practice of medicine to answer that appeal. Those who come to us asking for the waving of wands must be sent empty away. We have no right to misapply the consecrated ritual of medicine and surgery to meet that need. Humanity stumbling through the valley of the shadow needs trusty guides. It does not expect omnipotence, omniscience, or infallibility, but craves deeply for honesty.

CATALOGUE OF INSTRUCTIONAL FILMS

The catalogue of instructional films which has recently been issued by the Central Information Bureau for Educational Films (103, Kingsway, London, W.C.2) does not claim to present an exhaustive list, but is believed to be the first convenient conspectus of the films available for use by educational and social organisations in Great Britain. It is a survey rather than an assessment of the existing material, no discrimination in respect of quality having been made. The films are grouped under ten main headings, including agriculture, art, history, science, and so forth. The science section is further divided into seven subheadings: anthropology; astronomy; hygiene, nursing, and child welfare; nature study; physics, chemistry, and geology; physiology; and psychology. The title of each film, its length in feet or minutes, whether it is on flammable or inflammable stock, is silent or talking, are recorded with the organisation from which it may be obtained. An alphabetical list of the Government departments, societies, and business firms mentioned in the catalogue is given at the end. The book is issued free to subscribers to the bureau and is available to non-subscribers for 3*s.* 6*d.*

NEW PREPARATIONS

Angiolysin.—For this preparation, which has been sent to us by the Chemische Fabriken (Dr. Joachim Wiernik, A.-G.) Berlin-Waidmannslust, the quality of coronary dilatation is claimed. The manufacturers state that clinical trials have proved its use in primary attacks of angina and other cardiac irregularities, and quote medical authority in support. It is supplied in tubes each of which contains 25 tablets of the preparation, which consists of adenosinphosphoric acid and pyrrhodid, described as a new *dimethyl-aminophenazonrhoden* combination. The drug is thus designed to act as a dilator and antispasmodic. The agents for distribution of this preparation are Messrs. Coates and Cooper, Clerkenwell-road, London, E.C.

Ergocholin.—The same agents distribute from the Chemische Fabriken this preparation, which is a combination of the cholin derivative Pacyl and pure ergot, the alterations in blood pressure sometimes set up by the latter being compensated for by Pacyl. The preparation has also received medical support in Germany.

Allergilac.—We have received from Messrs. Cow and Gate, Ltd., Guildford, a sample tin of this new milk food which is designed for use in cases of allergy in infancy. Sensitisation to protein manifests itself in infancy in a variety of ways, and in some cases infants develop under it serious attacks of dyspnœa and asthma, urticaria, or vomiting. Entire omission of milk in the diet is well-nigh impossible, and an attempt is made in this preparation to remove the offending protein. The composition of allergilac is:

	Powder.	Reconstituted milk (1 in 8).
Moisture	3·0	88·0
Fat	15·5	1·9
Casein	24·0	3·0
Lactalbumin	1·0	0·1
Ash	6·7	0·8
Lactose	49·8	6·2
	100·0	100·0

Acidity 27°
pH value 6·0

OPERATION FOR CARCINOMA OF THE CARDIA

Local resection of the œsophago-gastric junction for carcinomatous obstruction is a palliative measure which is rarely held to be justifiable. The course of gastric cancers is usually rapid, and when complete removal of the growth is out of the question it is always doubtful whether an operation of this magnitude is worth while. At the same time R. Ingebrigtsen,[1] who reports a case which was treated successfully in this way, points out that subsequent restoration of the continuity of the alimentary canal is here comparatively easy, and that the operation offers a means of overcoming the difficulties of feeding and of avoiding gastrostomy or intubation with their attendant disadvantages.

His patient was a woman of 49, with a year's history of progressive dysphagia and emaciation. The diagnosis of carcinoma of the cardia was established by radiographic and œsophagoscopic examinations. As a preliminary, pneumothorax was induced, with phrenic evulsion in addition in case it should prove necessary to open the chest. Laparotomy under ether narcosis revealed an extensive growth, infiltrating the wall of the œsophagus for about a centimetre, spreading into the gastro-colic ligament and great omentum, and adherent to the pancreas, aorta, vena cava, and splenic artery. Radical operation being judged impracticable, local removal was decided upon. The growth was dissected away from the structures to which it was adherent and was removed by cutting through the stomach below it and the œsophagus above. The gap in the stomach wall was closed and œsophago-gastrostomy was performed. A temporary jejunostomy was then made for feeding purposes. Despite the various adverse conditions (cancerous infiltration of surrounding parts, the septic state of the growth), healing took place satisfactorily except that a fistula remained; this admitted lipiodol but was too narrow to allow of leakage of food after the first day of mouth-feeding.

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[1] Acta Chirurg. Scand., 1933, lxxiii., 43.

Unfortunately the subsequent history of this patient is not given. The value of case reports such as this would be greatly enhanced if they were not published until the results of the treatment could be stated.

MEDICAL EDUCATION IN BURMA

THE Burma Government Medical School at Rangoon reports on an active year's work. Forty new students were admitted in June of last year. Out of 42 students who took the second part of the final examination, 23 passed. The total number qualifying as sub-assistant surgeons was 38 men and 4 women, a pass percentage of 80. The figure is very high compared with the 22 men and 4 women of the preceding year, and the 10 men and 2 women of the year before. It is probably a peak, because the balance sheet shows a drastic reduction of expenditure—a decrease of nearly Rs.17,000—which can hardly fail to be reflected in the future output. From the analysis of religions and races about half the students appear to be natives of Burma and the remainder Indians, with a sprinkling of Europeans and Anglo-Indians; of the 42 who passed during the year under review, 33 were Indians and only 7 Burmese, 2 of whom were women. The prize-winners and gold medallists, with only one or two exceptions, appear from their names to be Indians. The improvement in the teaching of anatomy and physiology has, the superintendent says, been maintained, and the usual course of training in practical midwifery was given at the Dufferin Hospital, Rangoon. The discipline, conduct, and health are reported as satisfactory.

BIOLOGY IN SCHOOLS

A WELCOME sign of the changed attitude towards the inclusion of the biological sciences in the ordinary school curriculum is seen in the number of books now appearing which deal with these subjects in an elementary way. Miss M. E. Phillips and Miss L. Cox, who have already published one text-book on elementary biology for students of matriculation standard, have now prepared an admirable introduction to the subject[1] in response to many requests for something simply written. The approach to biology, considered by them to be the most satisfactory, is through "Nature Study"; hence the examples chosen for study are plants and animals familiar to town and country children alike. They are also for the most part such as can be kept or examined in an ordinary classroom. The book should prove of value in giving an idea of some of the life processes to quite young children. It is interestingly written, in very simple language, with a minimum of technical terms, and has an abundance of illustrations. The adult reader may well be unfamiliar with the habits and ways of some of the more common living things considered, and may be stimulated to carry out the suggested observations.

Another book recently issued[2] covers the ground necessary for students taking biology in School Certificate examinations. It is naturally more limited in range, since a sufficiently detailed account of the various "types" of animals and plants prescribed in syllabuses must be supplied. The descriptions are as brief as is compatible with competent treatment. In the later chapters Dr. Wyeth discusses general biological principles, and this part of the book is enriched with clear accounts of many instructive experiments which can be carried out without much apparatus. The chapters dealing with nutrition and respiration in plants and animals and with irritability are good, and teachers of biological subjects in general will find the experiments suggestive. The issue of such books as these will encourage those who long have been pleading for the introduction of the biological sciences into the routine school curriculum.

TECHNIQUE IN ACTINOTHERAPY

Sir Henry Gauvain says in a foreword to a book on actinotherapy, issued by the Sollux Publishing Co.,[1] that it supplies in convenient form an aid to special technique in treatment which is practical, illuminating, and helpful. A part only of the whole field of actinotherapy is reviewed, since the subject matter is restricted to irradiation with quartz lamps, luminous heat being introduced as an adjuvant to treatment; but if this limitation is borne in mind the information given will be found complete and accurate. We are told by the editors—unnamed—that nearly 1000 books and papers have been consulted in building the outline of the technique presented. References to these works are given under each section, and thanks are due to the publishers for making this vast amount of original work accessible to the general reader. The criteria adopted in the choice of publications consulted are (1) personal experience of the treatment described and (2) absence of later publications superseding the work published. There are few statements in this small manual to which exception can be taken. One may question, perhaps, if the optimism of the section on treatment of high blood pressure reflects the generally accepted opinion. A temporary fall in blood pressure has often been recorded, but not all workers agree that a more permanent favourable result may be expected. The advisability of irradiation during the acute stage of anterior poliomyelitis is open to question, especially if combined, as here suggested, with static electricity to lower spine and mechanical vibration. The section on the treatment of tuberculosis is perhaps the most helpful. In connexion with the paragraphs dealing with the treatment of tuberculous adenitis, it should be pointed out that not all actinotherapeutists are in favour of intensive local treatment as an adjuvant to general irradiations when glands approach caseation. The index of references given to authoritative literature is one of the most useful features of the manual.

SURGICAL TUBERCULOSIS IN THE SENEGALESE

NATIVE troops garrisoned in the south-west of France present some special problems to the medical officers in charge of them. For example, tuberculosis behaves so differently from the same disease in Europeans that, but for Koch's discovery of the tubercle bacillus, the clinician would be tempted to recognise two quite different diseases. In the *Archives de Médecine et de Pharmacie Militaires* for May, Lieut.-Colonel M. Courboules discusses the difficulties to which these differences give rise. His material consists of four score natives of Senegal and Madagascar who developed some form or other of surgical tuberculosis while serving in the army in France. Characteristic features of the tuberculosis they developed were the speed with which it progressed, the difficulty with which it was diagnosed in an early stage, and the impotence of standard methods of treatment. In uncomplicated Pott's disease, for example, the European usually takes two, three, or four years in which to stabilise his lesions. Such stabilisation, with disappearance of pain and bacillæmia, and formation of new bone, is almost unknown in the Senegalese. In his case the local disease tends to become general and speedily to end in death. Among about 30 cases of Pott's disease, more than half were dead within a year of the first consultation, and within ten months of admission to hospital. Only in 5 cases was it possible to check the progress of the disease to such an extent that the patients could be repatriated; even in these cases Courboules ends his discussion of the ultimate prognosis with three exclamation marks. Among 7 cases of hip disease, there were 4 in which death occurred in 7 to 15 months. Matters would not be so bad but for the difficulties attending early diagnosis. This is hampered not only by peculiarities in the early manifestations of the disease in the native, but also by his inability to express himself intelligibly. Medical practice among the Senegalese is in this respect comparable with veterinary surgery; and Courboules quotes from a fellow army surgeon who found among 167 men admitted to hospital for Pott's disease as many as 21 in which this diagnosis could not be upheld. Among 82 alleged cases of hip disease there were only 59 in which the same surgeon could confirm the original diagnosis. The European's capacity for self-expression is usually supplemented by unequivocal X ray signs of Pott's disease. The inarticulate Senegalese, on the other hand, is badly served by X rays, which failed Courboules in every third case. His sombre picture of surgical tuberculosis in the dark races ends with the advice that the patient be repatriated as quickly as possible. A probability diagnosis should suffice, for when the diagnosis is clinched the patient is often too ill to be moved.

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[1] A First Book of Biology. By Mary E. Phillips, B.Sc., Biology Mistress, Godolphin and Latymer School; and Lucy E. Cox, B.Sc., F.L.S., Lecturer in Biology, Graystoke Place Training College. London: University of London Press. 1933. Pp. 270. 2*s*. 6*d*.

[2] Elementary General Biology. Part I. By F. J. Wyeth, M.A., Sc.D. Cantab., D.Sc. Lond., Headmaster of Newport School, Essex. London: G. Bell and Sons, Ltd. 1933. Pp. 202. 3*s*. 6*d*.

[1] Actinotherapy Technique, with foreword by Sir Henry Gauvain, M.D., M.Chir., F.R.C.S. Slough: The Sollux Publishing Co. 1933. Pp. 184. 6*s*.

VITAMINS

THE subject of the vitamins has recently been well covered in English by publications of varying degrees of cost and erudition. A manual[1] by an American worker, Prof. Barnett Sure, gives an adequate account in a small space of the most important aspects of accessory food substances. It is marred by a tiresome tendency to bring in long words and explain them, when no long word need have been used, and, for the English reader, by forms of speech unfamiliar to him. There are some notable omissions, such as the failure to mention the name of Szent-Györgyi in connexion with hexuronic acid and vitamin C, although other names are mentioned. Intelligent laymen as well as medical students will, however, find here the essentials of what is known about vitamins.

GIANTS AND DWARFS

A SMALL book on giants and dwarfs[2] falls into that rare category of essays which make the reader wish that they were much longer. The introductory historical section, giving accounts of abnormally large and unusually small people, is absorbing, and one feels that Mr. Futcher must know many more stories of giants and dwarfs which he could tell us if he were encouraged. The description of John Hunter's acquisition of the skeleton of the Irish giant is particularly well told. The notes on the purely physiological aspect of the subject are rather disappointing, partly because they are too compressed and partly because some of Mr. Futcher's theories of endocrine activity are not quite up to date. It is fair to remember that a determination to be really up to date in descriptions of the aberrations of function of the ductless glands would imply the issue of new editions of any publication almost monthly. Mr. Futcher's true fairy tales cannot fail to interest his readers.

NUMBER OF PRACTISING DOCTORS IN GERMANY.—A recent issue of the *Medizinische Klinik* gives the latest figures for the number of practitioners in Germany. On Dec. 31st, 1931, there were about 51,000 German doctors living, of whom 48,000 were in practice, a number showing only a trifling increase on those at the end of the two previous years. The number of doctors to 10,000 inhabitants remains at 7·4, and the number to 100 square miles at 10·2. As in previous years there was in Germany roughly one doctor to every 1350 inhabitants. The number of women doctors was somewhat larger than heretofore—550 more than in 1928, 1000 more than in 1927, and nearly 2700 more than in 1909.

FOREIGN BODIES IN THE CORNEA.—An electromagnetic extractor has been designed by Messrs. Frank Moss and Co. (23, Warwick-row, Coventry), for the removal of metallic splinters embedded in the cornea. The apparatus is handy and portable, and on attachment to any dry battery or accumulator of 2 to 6 volt capacity it develops a drawing power of at least four ounces, which should be ample for the removal of a foreign body from the cornea. It seems likely that in this way metallic splinters which are magnetisable can be removed more quickly and with less trauma than by an ordinary spud. The price of the instrument in silk-lined case is 35*s.* post free.

COURSES IN STAGECRAFT.—Those who are responsible for entertainments in institutions and hospitals are reminded that the winter course on dramatic production, at the Everyman Theatre, Hampstead, will start this year on Sunday, Oct. 8th, at 3 P.M., and will be held on alternate Sunday afternoons till Dec. 3rd. The course will include classes in make up, costume design, scene and property making—all the practical knowledge, in fact, which enables a producer to give help to his players. There will also, this term, be a specialised course in play writing and play technique, and though comparatively few of our readers may be writing plays for themselves, this course should also be of use in the nice appraisement of possible plays for production. The course is organised by the Little Theatre, Citizen House, Bath.

REGISTER OF THE C.S.M.M.G.—We have received from the Chartered Society of Massage and Medical Gymnastics (Tavistock House North, Tavistock-square, London, W.C.1) a register of masseuses and masseurs, covering the period July, 1920, to April, 1933. As usual it gives, in addition to name and address, the additional qualifications registered in medical gymnastics, electricity, light, and electrotherapy, distinguishing between *teachers and those in* private practice. Following the alphabetical register is an index of names arranged under postal districts. In this edition of the register there are a number of gaps in the column for the address. In order to keep the register up to date each member of the society was asked to inform the secretary of her/his present address, and it was stated that, unless the information was received by a given date, the name only would appear in the new edition. The price of the register is 4*s.*—We have also received from the hon. secretary of the Scottish local board of the society (25, Queensborough-gardens, Glasgow, W.2) a list for 1933 of those members who are practising in Scotland. It has been issued with a view to providing medical practitioners in Scotland with a list more convenient for reference on account of its limitation to the Scottish area. No price is stated nor any indication given where the list can be obtained.

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[1] The Vitamins in Health and Disease. By Barnett Sure, Ph.D., Professor of Agricultural Chemistry, University of Arkansas, Fayetteville, Arkansas. London: Baillière, Tindall and Cox. 1933. Pp. 206. 11*s.* 6*d.*

[2] Giants and Dwarfs, a Study of the Anterior Lobe of the Hypophysis. By Palmer Howard Futcher. London: Humphrey Milford, Oxford University Press. 1933. Pp. 80. 7*s.*

ADDRESSES AND ORIGINAL ARTICLES

NEURASTHENIA: TOXIC AND TRAUMATIC*

BY H. V. DICKS, M.D. CAMB., M.R.C.P. LOND.
PHYSICIAN TO THE INSTITUTE OF MEDICAL PSYCHOLOGY, LONDON

NEURASTHENIA, as a clinical entity, is elusive. Everywhere we meet with the statements that it is rare, that it is but infrequently seen in pure form, that it is only with difficulty distinguishable from other disorders, and so on. Yet no name is more often upon the lips of both our profession and the laity when speaking of functional disorders, and with its cousins "nervous debility" and "nervous exhaustion" it accounts for a considerable proportion of health insurance claims. The word serves its most useful purpose perhaps as a vague generic term for almost any form of psychological disorder other than frank insanity; it appeases the layman's thirst for a label without shocking a false self-esteem; and fortunately the approved societies are not yet so advanced in psychopathology as to quarrel with it. Matters become more serious when, with its implication of a definite pathology, it satisfies the physician that he has arrived at the full diagnosis. Hence I submit that the concept has outlived its usefulness; that the symptoms described under the heading of neurasthenia can for the most part be related to other disorders; and that what remains—namely, states of true exhaustion as the results of the action of toxins, including those of fear and of fatigue—should be called by some name that does not commit us to an obsolete theory, and should be regarded as syndromes or sequelæ of underlying conditions. This view is held, among many others, by Sir Farquhar Buzzard [1] and Prof. Millais Culpin.[2][3]

The position is strictly analogous to the concept of "rheumatism"—at one time the diagnostic rubbish-heap of a group of pathologically distinct conditions having a few symptoms in common—which is being gradually sifted and clarified into separate morbid processes. I hope to show that this position is no mere nominalist quarrel but is designed to promote understanding and to clear away sterile hypotheses, which are prevalent where psychopathological states are concerned.

We owe the concept of neurasthenia to Beard,[4] who in the 'seventies of last century began publishing accurate observations on the physical and mental symptoms of the neurotic. In thus drawing attention to a completely neglected field and emphasising the economic as well as the clinical importance of these subjective disorders, he deserved well of his generation. In coining the term neurasthenia, however, he launched a theory of pseudo-science for which we have paid dearly. About his time some of the physiological properties of nerve irritability had been experimentally demonstrated. Our knowledge of these experimentally ascertained facts even to-day is certainly not one which would encourage us to form very definite hypotheses of disease processes on their basis. They amount to the statements that (*a*) there is no fatigue in nerve trunks, and (*b*) that in intact animals "the break in the neuromuscular chain which is the expression of fatigue occurs . . . in the central nervous system and is probably due to some reflex inhibition."[5] The only types of physiological fatigue in the central nervous system described are those of repeated monotonous stimulation and those due to the direct action of experimentally administered toxic substances. Yet on grounds even scantier than these Beard built a hypothesis to account for the varied and heterogeneous symptoms that constitute the clinical picture of the various psychoneuroses, which to him presented but one continuous blurred whole. There is no need to state his theory in detail. For him neurasthenia is nervous—shall we say, neuronic—exhaustion, caused by an excess of waste over repair in actual neural tissues, resulting in instability of function and reflex irritation of all parts of the central nervous system, and thus producing the clinical state described by him, which to psychopathologists of to-day comprises all the minor psychoses including many hysterical symptoms, although hysteria existed as a separate concept in Beard's mind. Even the various phobias are accounted for by this theory, and notably "siderodromophobia" or fear of railways, for which I feel sure he postulated a separate cortical centre! The hypothesis, therefore, is purely one of nutrition—energy and its disturbances. The chief factor of blame is "civilisation" with its "wear" on the nerve-cells, and "indulgence of passions and appetites" and the "nervous diathesis" as secondary factors. This is the real connotation of the term neurasthenia, and one wonders whether this is the pathology conjured up in the minds of those who so frequently diagnose the complaint.

It cannot be denied that this purely material, neurological approach to psychopathology has had a paralysing effect upon medicine in general, because so long as we followed it we remained entirely outside the world of the patient's mind, moving on a plane which has no understanding of his personality as a whole and content with the vague, though doubtlessly true, postulate that somehow mind must be related to an activity in the central nervous system—with sedatives and sea voyages as our only therapeutic weapons. Indeed, one of Beard's own quotations vividly comes to mind. Speaking of the contempt for and neglect of the subject of neurasthenia on the part of the great physicians of his day he says ". . . so now imaginations of the patient were vaguely relegated to 'hypochondria,' a term which, in this generation, covers all the symptoms which the physician either doubts or misinterprets." If for "hypochondria" we read "neurasthenia" the position to-day is practically unchanged, save that the new element of focal sepsis has been introduced under the guise of "toxic neurasthenia." I cannot here dwell on the causes of this fear or lack of interest on the part of the majority of doctors in any matters affecting their patients' minds, but it is clear that medical education has as yet done nothing to correct and is doing much to perpetuate this attitude.

A TYPICAL CASE

My own faith in the myth of "nervous exhaustion" as the cause of functional disorder was shattered finally by the following case, which conformed to the classical features of so-called traumatic neurasthenia, and had the additional advantage of a suspected toxic factor. It is typical of numberless cases seen daily in general and hospital practice.

An electrician, aged 46, was admitted for out-patient treatment at the Institute of Medical Psychology complaining of very severe lack of energy, a high and easily

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[*] Summary of a lecture delivered at the Institute of Medical Psychology.

induced sense of fatigue after the least exertion, aches and pains in various parts of his body, pressure sensations over one side of his head, mild indefinite dyspepsia, creepy feelings down his spine, lack of concentration, moodiness, irritability, and insomnia, to mention only the most prominent of his symptoms. He was a valetudinarian, careful with diet, abstinent from every form of alcohol and alkaloid, and lately even of marital intercourse "in case it weakened him." This condition had come on some months before and was so severe as to necessitate sick leave, and was ushered in by a "fainting attack" while at work. There was a past history of three previous attacks, the first one at the age of 36 when the patient was, *in the course of duty, hit over the head* by the falling branch of a tree, and had several teeth smashed. In each case there were long periods, up to six months, of sick leave. On the physical side the patient was a stocky, well-preserved man who showed no abnormality except somewhat enlarged tonsils, some pallor of the face, a very unstable systolic blood pressure: on the first examination it was 145, after a few interviews at rest it was 105, diastolic 65—i.e., rather low. The urine was normal, the blood picture showed 4,800,000 red cells, hæmoglobin 80 per cent., and 8000 white cells with a normal differential count. The patient had had several attacks of severe tonsillitis in his younger days. He attributed his troubles to overwork and conscientiousness. He was now threatened with compulsory retirement. His own doctor was at a loss as to the treatment, but realised the nature of the condition.

Doubtless, it will be said, a case of "toxic neurasthenia" due to tonsillar sepsis and overwork—"nervous exhaustion" in fact. There were, however, certain factors in the history and clinical picture which suggested a different story.

As an experiment the tonsils were, for the moment, left alone, and psychotherapy in the form of a modified analysis was tried. A long and somewhat complex story emerged at the next few interviews, which amounted to this:—

Patient had been very ambitious and successful, and was pleased with himself to the point of conceit. On each occasion when he developed an attack of "neurasthenia" he had been in emotional difficulties, chiefly through conflict with his superiors. The first attack—where he was hit by the branch—was not associated with any notable physical injury, yet the headache he had since had was always just over the site of the original blow. It also emerged that patient as a child had been extremely backward and had been regarded as the disgrace and idiot of a large working-class family. The present attack had occurred as the result of a severe and apparently *unjust reprimand by a superior officer, following upon a* day of minor domestic misfortunes. The patient had left his office in a condition of intense excitement. At this point of the narrative he came to a complete break in his conscious recollection, and only remembered being delivered at his front door—some ten miles away—by a friendly lorry driver.

In order to break through this amnesia covering some hours, hypnosis was resorted to. As soon as this was achieved the patient broke into violent weeping, convulsed with emotion, exclaiming "Mummy, mummy!" He was allowed to express these feelings freely, was then made to recollect the events of the amnesic period which amounted to his sitting weeping by the roadside in an agony of thwarted rage and self-pity, and being at last picked up by the friend who happened to pass. He was finally told to remember all this when he awoke.

Two days later he was next seen, when he reported that all his symptoms had completely disappeared and that he felt quite strong. He resumed work in his garden *almost immediately, was able to go for 5 and 10 mile walks,* and returned to duty within a fortnight. Analytical treatment was continued and, briefly, revealed the following development:—

As a backward child he was made the family scapegoat and had vivid memories of severe and brutal punishments by his drunken father, which drove him at first to his mother's side for protection. Later on he felt ashamed of being a "mother's boy" and overcompensated for his feelings of weakness by an assertion of independence and the determination to "outdo them all," which, in point of fact, he achieved at the cost of repression of the earlier fearful "mother's boy" in him, which was thus entirely banished from his idea of self. Subsequently, as usually occurs, all men in authority became to him symbols of his father, and his reaction to them was a priori one of resentment and defence. A situation in which they criticised or blamed him was intolerable and was the signal for the mobilisation of the old conditioned response of fear. *Being intolerable to the patient's conscious self,* this defended itself by repression and—in the amnesia of the "fainting attack"—by dissociation against the *experience of the dreaded emotion. The trauma of the* falling branch was conditioned by an early experience of some falling stones in which he narrowly missed being killed, the memory of which was also recovered after the general repression had been lifted by the hypnosis. The significance of this story burst in upon the patient's mind quite spontaneously, and the doctor's part was that of passive listener.

The symptoms were thus, one and all, explicable in terms of repressed fear or anxiety which, when released therapeutically, ceased to operate. The further purpose of the symptoms was to serve as an outlet both to his wish for sympathy (from the mother) and to his self-phantasy, which was *saying* "Look what a martyr to conscientiousness and duty I am, and how little my bosses (i.e., my rotten father) know what I am suffering through it." It effectively removed him from their persecution without loss of *amour-propre,* and he was *able to indulge* in the thought that it was all their fault. (These inferences are all derived from case material related by the patient.) He has remained well, on full work, as shown by follow-up, for the last six years.

DISCUSSION

There is only one factor absent from this case to complete the classical picture of so-called traumatic neurasthenia, and that is the question of claiming compensation for damages. In this man that wish appeared to be satisfied by the feeling that his employers were responsible for his condition, and also by the fact that he was, *after all, having a holiday* on full pay plus sickness benefit.

It is noteworthy that the condition first appeared after his accident when, so far as physical injury went, he only sustained a bruise and some scratches on his head; also, *that the psychological mechanism of* symptom formation is the same as that of hysteria, whether of the conversion type or of the anxiety type, a point on which again those taking part in the discussion on the subject at the Royal Society of Medicine in 1927[1] agreed. The psychopathology and treatment of anxiety states as such is not the concern of this paper, and my aim is merely to demonstrate that in the so-called *traumatic neuroses* (or neurasthenia) the same psychological factors are at work.

Concerning the psychopathological factors, Sir Farquhar Buzzard says:—

> "The nature of the accident *may be influential if it is* such as to evoke an emotional disturbance in the form of fear. Unfortunately this 'fright' is not referred to under its proper name; it is referred to as '*shock*' or a '*shock* to the system,' terms which carry no discredit to the patient and which suggest indefinitely prolonged consequences."

To this statement we may add that there must be a pre-existing *disposition in the nature of such a* complex as was quoted a little earlier on, dating from childhood, upon which the accident acts like a trigger: the natural reaction of fear, which is what a patient thus predisposed cannot admit to consciousness, is repressed and so led into the channels of pathological anxiety—or even of hysterical conversion into various physical disabilities ranging from pain at the site of any blow or abrasion to epileptiform seizures.

By reference to the case cited, one can also appreciate the other factors which operate in the mind of the patient (consciously or unconsciously) in traumatic neuroses: first and foremost the feeling of resentment and desire to get even, and its variant—the wish to play the hero or martyr—satisfying the self-assertive phantasy, and so easily resulting in the clamour for compensation. As the roots of this tendency may well lie in unresolved unconscious father complexes, it will be obvious that we have to regard the traumatic neurosis as a true and serious illness, in spite of the compensation factor, and from a legal point of view a company may well be held responsible to indemnify a sufferer from it because he is just as much entitled to travel, say, on a railway, as is a man with fragilitas ossium or hæmophilia, who for that reason may also run a special risk of injury.

The question of compensation in cash, however, presents only one aspect even of the so-called "litigation neurosis" which involves, as every psychoneurosis, the whole personality, and no amount of legislation will prevent the emergence of regressive, childish, egotistical urges in predisposed persons after the experience of a suitable trauma. This point is further brought home by the observation that some patients remain ill after their claims have been satisfied. This depends mainly on the strength of the infantile complexes or, as we may put it, on the degree of psychical regression. There are patients who, after a traumatic experience—especially in the war neuroses—will lapse into states of complete babyhood, trembling, weeping, inarticulate in the full sense of the term, unable to stand or walk (the so-called astasia-abasia), incontinent, and absolutely dependent on their nurses. It is these extremes that drive home the point in psychopathology, and they are occasionally met with in civilian practice. The moody, impatient, tearful, childish condition of many a neurotic depends upon this factor.

Most authors are agreed upon the importance of auto-erotic traits in the picture of so-called neurasthenia, quite apart from the traumatic types. Consciously expressed in these patients as the wish to be admired for their devotion to duty in spite of their terrible lack of energy, auto-erotism betrays itself in the unconscious desire for nursing, petting, and sympathy, and in the ever-present anxiety about and interest in their own body and its functions and sensations. It is the regression of unconscious attention (which is what we call interest) to this level, somewhat analogously to the neurological law of dissolution, which causes the withdrawal of concentrating power from the external world, and so the lack of attention and difficulty in work, diminution in sexual potency, and the feeling of being without energy. It means that psychic energy is being expended on the precious ego, that application to outer reality is a tremendous effort: hence, as Yellowlees [6] puts it, the complaint of extreme tiredness in everything but talking about their own illness. Sometimes, as Henderson and Gillespie [7] point out, a state of abnormal fatigability arises as the result of an entirely conscious conflict—perhaps a shifting of the attention to the symptom from the original trouble. This is, of course, just another variant of the working of the same unconscious tendency, and flight from the insoluble problem is accomplished by means of the illness through the psychic manœuvre of displacement at the behest of auto-erotic trends.

An interesting problem is raised by Sir F. Buzzard—viz., that in the people who receive severe physical injuries, traumatic neuroses hardly ever occur. The explanation seems to be that under these circumstances the patient will in any case be compensated both in cash and by medical and nursing attention and the sympathy of his environment, by which his egoistic needs are fully met.

THE FREUDIAN POINT OF VIEW

The Freudian school (as represented by Ferenczi [8]) have a place for the term "neurasthenia" in their classification, and denote by it what is to them a very definite pathological entity. It is a curious compromise between Beard's original view and Freud's own psychopathology of the libido. Along with the true anxiety neurosis (concerning which he states that it, also, is rarely seen in pure form) Freud classes true neurasthenia as a physioneurosis or actual neurosis, in contradistinction to the psychoneuroses, which are essentially the outcome of psychic conflict at an unconscious level.

The physioneurosis, according to him, has no psychopathology, and hence is not amenable to psychotherapy. The clinical picture he gives is the classical one of pressure symptoms in the head, spinal irritation, constipation, paræsthesiæ, loss of sexual potency, and depression, together with the cardinal symptom of abnormal fatigability. He finds the sole cause of the condition to be excessive masturbation—especially that which has continued long after puberty. This is supposed to drain away energy, just as Beard visualised it, but with this great difference, that the energy is "libido"—i.e., the psychic energy inherent in the sex instinct. Accordingly, the effect on the mind is more damaging than the actual physical loss. There is exhaustion of energy because of the total inadequacy of the external stimulus, and this inadequacy is supplemented by activity of the higher function of phantasy formation, whereas normal coitus discharges itself through lower nervous centres. The drain of sex tension is thus caused through the excessive demand upon a psychic energy investment. At the same time Freud has stressed the chemical, toxic side of this class of neurosis, which he considers to be due to intoxication by either undischarged or excessively discharged sexual substances—that is to say, an endocrine disturbance.

Like many others, I find it difficult to agree with this view, firstly because I have never seen a case resembling Freud's picture.

I have, for example, at present under my care a man of 30 who masturbates almost daily and has done so since the age of 15, a case of arrested psychological development, with a mother-fixation and various obsessional characteristics. He has at no time complained of any of the symptoms which are said to be characteristic of neurasthenia, and especially of no abnormal fatigue, and lately, with the successful analysis of his repressed aggressive, independent tendencies, he has experienced a very marked access in the feeling of general energy, concentrating power and interest in his work, in spite of the fact that he has, in respect of his sexual activities, not been much changed as yet by the treatment; he abuses himself just as much as before.

As a contrast I may mention another case, of a man of 50 with a very similar psychological state, in whom, however, the auto-erotic activity takes the form of literal narcissism, that is, the admiration of his naked image in a mirror and mild stimulation of his nipples, but owing to phobias he is especially careful to avoid seminal emission. He took several months before he could bring himself to speak of these things. This man does suffer from the neurasthenic symptom of being "whacked to the world," as well as impotence with his wife, and would have passed as a classical case of "neurasthenia." Here there is no drain through any actual discharge, but there is a considerable drain of psychic tension into the auto-erotic activity, and further into conflicts arising from this situation, as he is a very religious and self-critical man.

Secondly, Freud's hypothesis, paradoxically enough, insists on the absence of psychic factors, but does not inquire why a person should go on masturbating and forming erotic phantasies instead of proceeding to a normal sex life long after puberty. He does mention the bad mental effects of ideas of shame and fear about the act. It would seem plain—as Stoddart,[9] one of his most devoted followers, also points out—that we are dealing here with cases of repressed auto-erotism, with varying degrees of intrapsychic conflict between that tendency and the ego-ideals of the individual, and the degree of lack of energy is the measure of drain into this wasteful conflict of psychic tension. There is, therefore, nothing in the Freudian view to disturb the psychogenic theory of abnormal fatigability which I am advocating.

TOXIC NEURASTHENIA

The last factor—i.e., exhausting illness—is perhaps the only one which so far we have not considered, and which provides the link between what I have said and so-called toxic neurasthenia, or, as I prefer to term it, toxic exhaustion states. There is truth in the observations of low blood pressure and of hyperthyroidism both in infection and in anxiety conditions resulting from long-continued emotional conflict, though hyperpiesis may equally result from the latter. The most obvious and well-established mechanism here is via the sympathetic system to the adrenal gland—the fight or flight hormone—resulting in either overactivity or ultimate failure of the adrenaline output, with all that this would imply for the brain circulation, sugar utilisation, and affection of the secretions of other endocrine glands, and the ensuing secondary excitation of the sympathetic nervous system. These changes are set out with great clarity by Cannon.[10] Between these important functional disturbances we can without much difficulty account for most of the bodily symptoms of the anxiety state.

Any infection may, under conditions which are ill understood since they are by no means constant, act in much the same way as a chronically unsolved emotional conflict—i.e., by calling upon the defence mechanism of the adrenal gland, produce the picture of a state of exhaustion. This I believe to be the long and the short of what is known of so-called toxic neurasthenia. It appears also to be the reason for the picture of "debility" resulting from any infectious disease. Where the exhaustion state continues well beyond the normal period of weakness, one becomes suspicious of added psychological factors, the original illness playing now the part of the railway accident—a peg upon which to hang the auto-erotic wishes of the personality. As a matter of clinical practice this should lead us to investigate what advantage the unconscious of the patient may be deriving from his continued state of invalidism, what unpleasant piece of reality he may be spared, or whom he may be trying to dominate or compel to solicitude in this way. The psychically healthy person who is merely overtired through genuine overwork or the effects of an infection usually recovers in a short while and his energies flow out into the world again.

DIAGNOSIS AND TREATMENT

Only the briefest reference can be made to these, in the form of a few maxims.

(1) Exclude organic disease and manic-depressive psychosis.

(2) Exclude focal sepsis by real clinical and pathological tests, rather than diagnosing toxæmia to save the trouble of a psychological approach.

(3) Settle compensation questions quickly and finally.

(4) If focal sepsis is present, deal with it.

(5) Whether focal sepsis be present or not, give adequate psychotherapy.

Even from this sketchy survey of the approach to such cases it will have been gathered that there cannot be a specific treatment of the "neurasthenic syndrome," apart from psychotherapy in general. Neurasthenia is but a label, devoid of reality, concealing individual emotional conflicts. In that these are real to the patient and account for his condition, psychopathology, when put to the therapeutic test, has the advantage over mythological neurophysiology. In due course the present views will be, in their turn, superseded by doctrines more nearly expressive of the truth.

SUMMARY

(1) "Neurasthenia" is an obsolete term, expressing an obsolete theory completely obscuring the nature of the conditions it is intended to describe, and is typical of the still prevalent lack of understanding of psychogenic illness or psychological theory.

(2) It should therefore be discarded, but if it is not, we must be clear that we are using the word as an equivalent merely of "abnormal subjective fatigability without obvious organic cause."

(3) The symptoms of the so-called "neurasthenic" state—a syndrome rather than a disease—are manifold, but reducible to the effects of long-continued unconscious fear or anxiety via the sympathetic system and its physiological connexions, if indeed they have other than a subjective existence.

(4) The neurasthenic symptoms are therefore secondary to psychopathological conflict, and on the psychic side expressive of unconscious fear, auto-erotism, and the craving for protection and sympathy in the service of the primitive urge to self-preservation.

(5) These pathogenic factors exist in the patient since early childhood, of whose modes of reaction they are "vestigial" survivals, dormant but potentially active.

(6) These reactions are capable of being unmasked by severe frights such as occur in accidents—in which case they are dignified by the name of "traumatic neurasthenia"—or by any other psychic trauma.

(7) Cases exist where infective foci have produced a clinical picture of exhaustion similar to that of the psychoneuroses, and the physiological mechanism of the symptom production is presumably the same as in purely psychogenic or mixed cases.

(8) Apart from this toxic group, the treatment is that of psychoneuroses in general, as is illustrated by the cases cited, in whom abnormal fatigue was only a very superficial expression of endopsychic conflict.

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THE PHYSIOLOGY OF INSULIN

BY GEORGE H. TUTTLE, M.D.
ASSISTANT IN MEDICINE, MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.

THE word insulin, as used at present, is limited to the pancreatic hormone obtained from the islands of Langerhans of vertebrate animals, and for this reason we receive the impression that there is no other insulin in living organisms, which is not true. In plant life and in the life of all invertebrates carbohydrate metabolism takes place as perfectly as in vertebrates; glucose is oxidised and glycogen is formed by every animal cell (J. J. R. Macleod), and all this without the aid of a pancreas. It is evident then that there are cellular insulins as well as pancreatic insulin. Moreover, these cellular insulins, the evolutionary predecessors of the pancreatic insulin, still persist in vertebrates, as is shown by the fact that 60 per cent. of the carbohydrates ingested by Soskin's depancreatised dogs still metabolises after the pancreas is entirely removed.[1] Before presenting further concrete evidences of the existence of multiple insulins in animals and man, it is desirable to state in the form of a theorem my established beliefs in regard to the relation of insulin (of whatever kind) to the metabolism of carbohydrates, as developed from my clinical studies of diabetes.

THEOREM OF INSULIN

Diabetes represents a diminished state of carbohydrate metabolism which is due to a deficiency of insulin action. By introducing insulin subcutaneously this deficiency is completely overcome and the metabolism returns to normal. Therefore, the action of insulin is necessary for normal carbohydrate metabolism. Conversely, whenever carbohydrate metabolism takes place as shown by the respiratory quotient, insulin must be present; and finally, as a corollary, no carbohydrate metabolism can take place unless some kind of insulin is present. Conclusion: wherever carbohydrate metabolism occurs some kind of insulin, either pancreatic or cellular, or both, must be present.

Further evidence of the existence of multiple insulins in the body is offered by the following considerations:—

1. Metabolic data from the lives of 14 depancreatised dogs were published by Soskin.[2] From these data several general conclusions may be drawn. We will use as an example dog No. 6, which lived for 18 days after operation, or rather after withdrawal of insulin, and ate all of its food at every meal. A total of 1566 g. of carbohydrate was eaten by this dog in 17 days, and 616 g. of glucose were excreted in the urine, showing that an average of 54 g. per day (60 per cent.) was retained and utilised during this period. Such utilisation of carbohydrate could not have occurred without the assistance of insulin, and these data are direct evidence of the presence of cellular insulin after removal of the pancreas.

2. The paradox of Thalhimer also shows evidence of the presence of an insulin capable of reducing the blood-sugar to convulsive levels after all possibility of the continued action of pancreatic insulin has been excluded.

3. All animals below vertebrates lack a pancreas and yet perform all the processes of carbohydrate metabolism, including the deposition of glycogen, without the assistance of pancreatic insulin. Therefore some other form of insulin must be present.

4. Rectal injections of glucose with slow absorption, which cannot stimulate the flow of pancreatic insulin by either the neurogenic or humoral pathways, produce insulin effects which support the contention under discussion. Accurate tables of such injections prepared by Scott and Zweighaft[3] serve as a basis of argument. Two sets of cases were used. To nine medical students, after fasting 12 hours, were given 200 c.cm. of 10 per cent. glucose solution by rectum. In a later test on 50 normal individuals, 400 c.cm. of 10 per cent. glucose solution were given. The average amount of glucose recovered from the stools after four hours was 19 per cent. in both groups. This showed an actual absorption of about 80 per cent. of the sugar injected. The blood-sugar was definitely although slightly lowered, instead of raised, by this absorbed sugar. The blood-sugar level may be affected: (*a*) by sugar entering the circulation, which raises it; (*b*) by insulin entering the circulation, which lowers it. It is perfectly evident that these amounts of sugar would have raised the blood-sugar appreciably if insulin had not acted at the same time. So the conclusion should be drawn that, although absorption from the rectum occurred in goodly amount, sufficient insulin (of some kind) was brought into action to oxidise this glucose and keep the blood-sugar slightly below normal. Since pancreatic insulin could not have been stimulated through either the neurogenic or humoral pathways as now known, it must have been cellular or tissue insulin which did the work.

5. Depancreatised dogs, during the first five days after operation, present a respiratory quotient of 0·70, or thereabouts, showing that fats alone are oxidising; but, as will be shown later, insulin is necessary for the oxidation of fat as well as of carbohydrate. Therefore some extra-pancreatic insulin must be present in the dog.

6. A certain case of cancer of the liver, reported in great detail by Nadler and Wolfer,[4] offers further evidence of the existence of non-pancreatic insulin.

> Attacks of hypoglycæmia lasting four and a half months gradually increased in intensity until the patient could only be kept alive by injecting 30 g. of glucose intravenously every hour. Autopsy revealed a cancerous mass occupying 70 per cent. of the liver; the pancreas, examined by Prof. Bensley, of Chicago, was normal and the tumour tissue from the liver was not islet tissue. There was no increase or decrease of islet tissue in the pancreas, nor any change in the islets themselves; the tumour tissue gave negative results as regards islet granules.

The tumour was evidently not metastatic; frequent tests of the blood were made during this whole period, and it was never found above normal levels in spite of the fact that overfeeding of carbohydrates together with the intravenous injection of large amounts of glucose were practised continually. How shall we account for this great increase of carbohydrate metabolism? The ingested carbohydrate together with the glucose of the injections entered the blood. Meanwhile, the growing cancer cells, which are known to burn up at least ten times as much glucose as normal cells, were draining off from the blood such quantities of this glucose that the blood-sugar was never found above normal levels. We have now located this excess sugar in the cancer cells themselves, and I contend that, unless these cells produced an enormous increase of cellular insulin, this process of growth could not go on. All this continued for a period of four and a half months. If this enormous amount of insulin had been supplied from the pancreas there would have been evidences of hypertrophy, but there were not.

7. Specimens of different animal tissues isolated from the bodies of the animals formerly possessing them have been made to live for years by Carrel and others by keeping them immersed in a carbohydrate nutritive solution. Without the aid of pancreatic insulin, but by the aid of their own cell insulins, these isolated cells perform the necessary process of carbohydrate metabolism and live and grow for years. The yeasts also present a perfect ability to perform all the functions of a complete organism, as far as carbohydrate metabolism is concerned, without the aid of pancreatic insulin. If a few yeast cells are placed in a half-tumbler of sterilised water to which glucose has been added, they will immediately proceed to metabolise the sugar with the production of heat and carbon dioxide, and in addition will be found to have deposited as much as 30 per cent. of their weight in glycogen in some cases, thus showing their ability to oxidise glucose and deposit glycogen; so that we wonder if anybody can explain how they do it—unless there is some form of insulin in their cells.

8. Efforts to extract cellular insulin from the tissues of depancreatised dogs have lately been made without success by eminent physiologists, and the conclusion has been too hastily arrived at that this settles the question of its existence. Far from it; many eminent men failed to extract pancreatic insulin for more than 30 years before Banting finally obtained it. But there are reasons why they have failed to find it, and two of these reasons are:—

(*a*) Pancreatic insulin exists in the pancreas in an inactive state in a particular chemical form; in this form it may be obtained in alcoholic extracts and used commercially. Cellular insulin, on the other hand, is produced in active form within the cell limits where it exerts its functions, and is probably entirely different chemically, and, as recent experiments have shown, cannot be extracted by our present methods.

(*b*) The attempts at extraction from the tissues of depancreatised dogs prepared after the most modern methods have all been made five days after the withdrawal of insulin.

As I have tried to show from Soskin's tables, the cellular insulin as shown by the respiratory quotient does not increase sufficiently until after ten days or thereabouts to exert its compensatory function as a necessary agent of carbohydrate metabolism, and consequently does not exist in sufficient amounts at the five-day period to be extracted, even though more suitable methods than the present ones were known and used. The evidence for the existence of this insulin may be shown in many ways besides extraction, and as that may be delayed for 30 years or more, we had better consider other methods; but in any event, let it be known that this question is not closed by these failures at extraction; on the contrary, it is wide open for further investigation.

9. Out of the mass of incessant research of the last decade, two hypotheses have appeared and gained strength which add further support indirectly to the hypothesis that insulin in some earlier enzymatic form exists in the cells of plants and lower animals and persists in the tissue cells of man in addition to the especially developed pancreatic insulin. The hypothesis that diabetic tissue still retains the power of metabolising glucose, as well as the equally important hypothesis that the pancreas is the sole source of insulin supply, have been pretty well established; but these two hypotheses contradict each other. In the diabetic dog there is no pancreas, yet much carbohydrate metabolises. Lusk, in the early days of the insulin period, denied the ability of diabetic tissue to utilise carbohydrate, basing his conclusions on the fact that (1) the respiratory quotient in depancreatised dogs 3 to 5 days after operation was 0.71, the theoretical level of fat metabolism; and (2) all carbohydrate ingested was excreted quantitatively in the urine. These conclusions were logical at that time, but are no longer sufficient to establish his hypothesis that diabetic tissue cannot consume glucose. Then, diabetic dogs lived 10 to 12 days or less; now, Soskin by improved methods has been able to make such dogs live 3 to 4 weeks without insulin or raw pancreas, with protein food alone as nutriment; and has published extensive data upon the condition of 14 such dogs. In these dogs the respiratory quotient gradually rises after 10 days and often reaches 0.90 before death. Also in these dogs the whole amount of glucose derived from the protein food is not excreted quantitatively, so that Lusk's contention no longer holds and we are forced to the conclusion that diabetic tissue can consume glucose. But this last conclusion conflicts with the hypothesis that the pancreas is the only source of insulin, and some explanation is needed to harmonise the two conflicting theories. It is therefore necessary either to abandon these hypotheses which have seemingly been established, or to accept the theory that cellular insulin exists in the cells of the tissues, since they oxidise carbohydrate—and to modify the last hypothesis by saying that the pancreas is one of the two chief sources of insulin in the body. Only by accepting this new hypothesis can we harmonise existing theories.

PHYSIOLOGY OF THE PANCREAS AS REGARDS INSULIN: RELATION TO DIABETES

The functions of the pancreas represent higher developments of the functions of simple cells. It is evidently a factory for the production of agents necessary for the digestion or metabolism of foods. These agents in the form of enzymes or hormones exist in simpler form in each cell of lower animals which have no pancreas, and in plants in which metabolic processes, resulting in the oxidation of foods with the release of energy and the discharge of carbon dioxide, take place as perfectly as in the higher organisms. It is especially important to realise this in regard to the internal secretion, insulin, which exists in simpler form in every tissue cell. Pancreatic insulin therefore is a higher development of cellular insulin. In this development a further division of labour occurs in which pancreatic insulin receives a greatly increased power of oxidising glucose, while cellular insulin retains its feebler power of oxidation but assumes the sole responsibility for the deposition of glycogen. It is believed that the other enzymes of the pancreas—trypsin, amylase, and lipase—are equally represented in the cells of lower animals, since they metabolise fats and carbohydrates as well as proteins in maintaining nutrition.

Before considering the neurogenic and humoral control of the pancreas, let us examine further the insulin of the pancreas. There is reason to believe that insulin, like trypsin, is stored in the pancreas in the form of a zymogen or, as we should call it, insulinogen, and that it remains inactive until something activates it. That this must be so may be seen by referring to the strictly scientific experiments of Clarke,[5] of Johns Hopkins, in 1916. These, briefly summarised, were as follows. The heart and pancreas were perfused separately and then together, under a perfect technique. Locke's solution was used as the perfusing fluid and this contained glucose in physiological amounts. When the pancreas was perfused with this mixture no glucose disappeared from the solution. Yet the pancreas was full of insulin, but it was in an inactive state. When the heart was perfused the same amount of glucose disappeared as when normal blood flowed through it. In another experiment the solution was first perfused through the pancreas (from which it absorbed inactive insulin) and then passed through the heart. In this last test from 10 to 30 times as much glucose disappeared, showing that much inactive insulin was taken up by the solution while passing through the pancreas, and that this insulin became activated while passing through the heart by some agent causing glucose to disappear.

The pancreatic insulin as it exists in the pancreas, as well as in our pharmaceutical product, is inactive until it leaves the pancreas. This brings up a most serious question in the ætiology of diabetes. Is the diabetes caused by deficiency of insulin or by a derangement of the activating mechanism? The chemical formula of this inactive pancreatic insulin (insulinogen) must be different from that of tissue insulin which is produced within the cell in an active state and performs its metabolic functions within the cell limits. Hence, failure to extract active insulin from tissue cells by the same process as has been used for the extraction of inactive insulin in the form of insulinogen fails to prove that such tissue insulin does not exist in the tissue cells, especially as metabolic data show that such insulin must be present to account for the metabolism taking place in depancreatised dogs.

Either the activating agent of insulin must be produced within the tissue cells as a co-enzyme and sent out into the surrounding media to produce oxidation, or the inactive insulin must enter the cells; or else the insulin must become activated at the time of its discharge from the pancreas when it becomes freed from the inhibiting effect of trypsinogen, discharge being brought about by neurogenic impulses caused by high blood-sugar, or by the influence of the duodenal hormones, secretin and duodenin. However uncertain the preceding conditions may be, the fact remains that pancreatic insulin requires an activator, and the serious question of whether the pre-insulin or the activator is deficient, and hence the cause of the diabetes, still remains to be answered. In insulin-resistant cases of diabetes it seems probable that it is the activator which is lacking, since there is always an abundance of injected insulin present in the body.

The production of the various enzymes of both the external and internal secretions of the pancreas is a vegetative function of the individual cells, whether acinar or insular in nature. These cells become filled with granules (Bensley) which disappear during the fasting periods. The discharge of these enzymes from the pancreas is brought about by nerve stimuli transmitted from the central nervous system through the vagus nerve to the individual cells, and by certain hormones formed in the mucosa of various parts of the alimentary tract during the active stages of digestion. These pathways of control are called the neurogenic and the humoral. The humoral control is the main and usual stimulant of the discharge of the pancreatic agents, whereas the neurogenic stimuli are only required for the finer adjustment of the supply of enzymes as required by the economy.

Humoral control.—The action of secretin is of the greatest importance. Physiologists agree that it is formed in various parts of the alimentary tract by the action of a weak acid on the epithelial cells lining that tract. They agree that its action stimulates the flow of the gastric juice, the pancreatic juice, the bile, and the succus entericus. Until two years ago it was also believed to stimulate the internal secretion and thereby increase the flow of insulin into the blood, but this theory is no longer tenable, as will be shown. The usual source of secretin is the duodenal mucosa, but this also contains other hormones which have separate actions, and since these have often been present in secretin preparations used for experimental purposes the results were incorrect, and some things were ascribed to the action of secretin which were due to these other hormones existing as impurities. For this reason Banting and La Barre both thought that secretin must also cause discharge of the internal secretion, insulin, since in their experiments the blood-sugar fell. Still,[6] however, succeeded in extracting a pure secretin, and with this there was no fall of the blood-sugar. La Barre took part in these latter experiments and agreed to the result, so that it can now be definitely stated that secretin does not cause the discharge of insulin into the blood. But it also appears from these experiments that something contained in duodenal extracts does cause the discharge of insulin and a fall of the blood-sugar, and this something I will call "duodenin" for purposes of identification.

The humoral control of the pancreas, then, is brought about through the action of secretin, duodenin, and perhaps other as yet unknown hormones. These cause the outflow of both the external and internal secretions, and their production in the mucosa of the alimentary canal is dependent upon the entrance of food into the canal and the inauguration of the normal processes of digestion during which dilute hydrochloric acid is liberated in the stomach. But one more point must be noted in regard to the discharge of the internal secretion. Whereas secretin alone causes the discharge of the external ferments in the pancreatic juice, both secretin and duodenin acting together are necessary for the discharge of insulin into the blood. This will be shown in a later article by a series of experiments which I have performed to demonstrate this fact, although the early experiments of both Banting and La Barre prove the point; their trials, however, were by hypodermic injection while mine were entirely by mouth. It follows therefore that a deficiency of either secretion would result in a deficiency of insulin in the blood through a diminished discharge from the pancreas.

Neurogenic control.—Although the humoral control is the main and usual one, the neurogenic in a compensatory way is often called upon to help out both in health and in diabetes. Any unusual rise in the blood-sugar stimulates the insulin centre in the brain and directly causes the discharge of insulin with a fall of the blood-sugar, as shown by the experiments of La Barre which were approved by Macleod.[7] In health there may be an unusually large and rapid absorption of carbohydrates from the food of the meal, raising the blood-sugar unduly. In diabetes (untreated) there is a permanently excessive rise. In both cases the neurogenic stimuli are brought into play as compensating agents increasing the discharge of insulin into the blood; but with this difference that in diabetes this nerve action must be kept up for months or years, so that it is easily conceivable that either the insulin centre or the conducting filaments of the vagus, or both, might become exhausted or even paralysed by this continuous over-stimulation, thus eliminating entirely the compensatory help of the nerve stimuli to the humoral agents and accounting for progressive deterioration in cases of untreated diabetes.

CORRELATING THE INSULINS

Finally, in correlating these facts in relation to diabetes, we must remember that pathological studies of the last few years have all shown that degeneration of the islands of Langerhans can no longer be considered the common cause of diabetes. The degeneration does not correspond to the severity of the disease. In children and acute cases the pancreas remains practically normal. In cases of long duration the degeneration is slight and no more than can be found in any other long exhausting disease affecting the nutrition of the cells. So that the pancreas may be sufficiently normal and yet a severe diabetes exist; and it is evident from our preceding study of the physiology of the pancreas in regard to insulin that any derangement of either the humoral or the neurogenic control of the discharge of insulin into the blood may cause a diabetes.

From the preceding study of the effects of the different stimuli through the neurogenic and humoral pathways upon the discharge of insulin from the pancreas, it is evident that it can only occur during the absorptive period following meals, because it is food, and the elements developed in its digestion, which bring into existence the humoral stimuli of insulin discharge; and it is the absorbed food which raises the blood-sugar and provides the neurogenic stimulus to this discharge of pancreatic insulin. So that both controls of pancreatic insulin depend directly upon the food of the meal.

Let us consider what happens commonly during the period from supper time at 6 P.M. to breakfast time at 6 or 7 A.M. From 6 P.M. to 9 P.M. the food is digesting normally in the alimentary canal and the humoral stimulants, secretin and duodenin, are being normally produced. During this same period the blood-sugar is first rising and then falling back to normal, and is producing its neurogenic effect on the discharge of insulin. But at the end of this period all food has passed out of the stomach and through the duodenum to parts beyond, and the blood-sugar has returned to normal, so that neither by the humoral nor by the neurogenic pathways can any more pancreatic insulin be brought into play. Furthermore, the fact that the blood-sugar has returned to normal shows that the pancreatic insulin produced for the meal has been thoroughly used up, and therefore no action from it upon the blood-sugar can continue after 9 P.M. This gives a clear field of nine hours' duration in which to study the action of the other or cellular insulin. The blood-sugar, during these hours of the night, would naturally rise above normal because the internal metabolism continues to throw sugar into the blood from the continuous breakdown of protein into amino-acids; and a continuous outflow of lactic acid takes place from the heart, respiratory and all involuntary muscles into the blood, from which the liver manufactures new sugar (gluconeogenesis), and there is an addition of sugar from the glycogen depôts when needed. If there were no insulin action at all during these hours, the blood-sugar would rise far above normal, as in diabetes. The very accurate experiments of Trimble and Maddocks,[8] however, show that there is no rise of the blood-sugar during the night in normal individuals; 24-hourly tests were made on nine medical students. The variation during the night lay between 93 and 97 mg., and the sugar curve was almost a straight line. From the above facts I draw the conclusion that cellular insulin alone controls the blood-sugar during the fasting periods, while pancreatic insulin exerts its powers only during the absorptive periods.

It is estimated by Cori [9] that only 38 per cent. of the carbohydrates are oxidised by pancreatic insulin; this leaves 62 per cent. to be either oxidised or converted to glycogen by cellular insulin or to be converted to fat. Since both glycogen and fat formation are much reduced in diabetes, it suggests that cellular insulin is likewise sadly deficient in that state. It should also be noticed in this connexion that whereas the direct stimulation of cellular insulin by the intravenous injection of glucose as used by Thalhimer produces a great increase of cellular insulin and fall of the blood-sugar, the high blood-sugar of diabetic states, existing for months or years, produces no such effect because for some reason the cellular insulin cannot be stimulated.

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NEMBUTAL IN LABOUR

A RECORD OF ONE HUNDRED CASES OF NEMBUTAL AND CHLORAL NARCOSIS

BY FREDA C. KELLY, M.R.C.S. ENG.[*]
ASSISTANT, OBSTETRIC UNIT, UNIVERSITY COLLEGE HOSPITAL, LONDON

THE following is an analysis of 100 consecutive cases of nembutal and chloral given to women in labour in the obstetric unit at University College Hospital. Acting on the experience of O'Sullivan and Craner[1] the following rules were formulated:—

A. Nembutal grs. 3 to be given to *primiparæ:* (1) when the os uteri is about three fingers' dilated and there are fairly strong pains at about five minutes' interval; (2) if the patient is distressed with strong pains, even if they are not occurring every five minutes, and the os three fingers' dilated.

B. Nembutal grs. 3 to be given to *multiparæ:* when the os uteri is about two fingers' dilated if there is distress. Nembutal grs. 1½ to be repeated once after three hours if labour is progressing and the pains are strong and regular. Chloral hydrate grs. 22 in all cases to be given twenty minutes after each dose of nembutal.

These doses vary a little from those given by O'Sullivan and Craner. They gave grs. 30 of chloral hydrate ten minutes after the initial dose of nembutal grs. 3, and their first repeat dose of nembutal grs. 1½ after two hours, and subsequent doses of both chloral hydrate and nembutal after three hours, up to but not exceeding a dose of grs. 7½ of nembutal in twelve hours. The modification in this series was considered advisable because the administration, timing, and dosing were left to the discretion of the labour ward sister. When it was found necessary to exceed the dose of nembutal, grs. 4½, medical permission was obtained. Chloroform or gas-and-oxygen was, with rare exception, given in all cases for delivery.

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[1] THE LANCET, 1932, i., 119.

Women admitted in labour have, in normal cases, two vaginal examinations: on admission and when the membranes rupture. Therefore it is often difficult to state with accuracy the exact stage of dilatation of the os uteri when the first dose was given. For this reason in this analysis the times are worked out in hours before delivery.

In some cases, when the patients were admitted very early in labour before the pains were regular or frequent, ʒ 1 of the following mixture was given, in addition to a subsequent dose, or doses, of nembutal and chloral: pot. brom., grs. 25; chloral hydrate, grs. 25; tinct. opii ♏ 7½; aq. chlorof. ad ℥ 1.

There was no alteration in the ordinary management of the first or second stage of labour, except that after the administration of the nembutal the patients were not allowed out of bed. They were encouraged to sleep, but no precautions were taken to darken the room or ensure more than ordinary quiet. Further, the fœtal heart was examined hourly and frequent blood-pressure records were made. Patients well under the sedative and sleeping quietly were frequently left alone for a few minutes at a time; mention will be made later of the restlessness sometimes met with, in which it was impossible to leave the patient at all.

THE PATIENT'S POINT OF VIEW

Each patient was talked to about 24–48 hours after delivery. All could remember being given some drug to drink, and whether or not there was any change in the pain after it. It is interesting to note that the same phrases occurred again and again in these women's description of their labours. "I went to sleep at once and I didn't remember anything till I heard the baby cry." "All I remember was being given stuff to smell." "I felt things as though it was a dream, and there was no pain at all." "I was helped a lot." "It made the pain worse and the baby came at once." There is a large clock in each labour ward, and one or two of the more intelligent women could remember the time they were "given their drink" and the time when they woke up again. This was unusual.

Of these 100 cases, 62 were completely successful from the patient's point of view. The cases were classified in five groups as follows:—

(*a*) *Very good*, 35. Complete or almost complete amnesia and complete analgesia.

(*b*) *Good*, 27. Marked but incomplete amnesia and complete analgesia.

(*c*) *Fair*, 21. No amnesia, but definite analgesia.

(*d*) *Poor*, 4. No amnesia, slight analgesia, quickly passing off.

(*e*) *Failures*, 13. Neither amnesia nor analgesia.

From these figures, therefore, in 62 cases the desired effect was obtained, in 21 the effect was very incomplete, and in 17 the drug was without effect.

(*a*) Of the 35 *very good* cases 31 were primiparæ and 4 multiparæ; the average age was 22·3 years; 24 were placid in temperament and 11 were nervous; 23 had been in hospital under 12 hours before delivery, 7 between 12 and 24 hours, and 5 over 24 hours. Twenty-nine of the 35 cases had a single dose of nembutal grs. 3, followed in twenty minutes by chloral hydrate grs. 22; 18 of these 29 had the drugs within 3 hours of delivery, 8 within 3 and 5 hours, and 3 over 5 hours before. It is interesting to note here that in the last 3 cases there appeared to be a definite susceptibility to the drug, since in each case the pain intervals were lengthened slightly and the patients were deeply asleep. Two required no chloroform for delivery. The actual time of administration in these 3 cases was 7¾, 6, and 6 hours respectively.

Five of the 35 cases had nembutal grs. 1½ and chloral hydrate grs. 22 in addition to the initial dose of nembutal grs. 3 and chloral hydrate grs. 22. In four cases the initial dose was given over 6 hours before delivery and the repeat dose under 3 hours before; in the remaining case the initial dose was given 10 hours and the repeat dose 6 hours before delivery. In the remaining one of these 35 cases nembutal grs. 7½ and chloral hydrate grs. 44 was the total dose given in 15 hours, the initial dose being given 21 hours before the birth of the child. This was the largest total dose in any of the 100 cases in the whole series.

(*b*) Of the 27 *good* cases 22 were primiparæ and 5 multiparæ; the average age was 25 years; 16 were placid in temperament and 11 nervous; 13 had been in hospital for 12 hours before delivery, 8 between 12 and 24 hours, and 6 over 24 hours. Twenty-one of the 27 cases had a single dose, grs. 3 of nembutal, followed by grs. 22 of chloral hydrate. Nine of the 21 had the drugs within 3 hours of delivery, 7 between 3 and 5 hours, and 5 over 5 hours before delivery.

Five of the 21 had a total dose of nembutal grs. 4½ and chloral hydrate grs. 44, the repeat dose being given 3 hours before delivery. The remaining one of the 21 cases had a total dose of nembutal grs. 6, chloral hydrate grs. 66, the initial dose being given 20 hours before delivery and the last repeat dose 5 hours before.

(*c*) Of the 21 *fair* cases 14 were primiparæ and 7 were multiparæ; the average age was 26·6. Fourteen were placid in temperament and 7 were nervous; 6 had been in hospital under 12 hours before delivery, 7 under 24 hours, and 8 over 24 hours. Seventeen of the 21 cases had a single dose grs. 3 of nembutal followed by chloral hydrate grs. 22. Seven of the 17 had the drugs within 2 hours of delivery, 3 between 3 and 5 hours, and 7 over 5 hours before delivery. The remaining 4 of the 21 cases had a total dose of nembutal grs. 4½, chloral hydrate grs. 44, the repeat dose being given within 3 hours of delivery.

In 6 of these 21 cases the dosage and times of administration coincided with those in which "good" or "very good" results were obtained—i.e., in the first 62 cases. The pains were not weakened and labour was normal. There was no apparent reason for the absence of amnesia and the incomplete analgesia. In 2 of the 21 cases there were exceptionally strong pains. In 5 cases the drug was given late in labour owing to the weak and infrequent pains throughout. In 4 cases the pains, from the administration of the initial dose of nembutal, were definitely weakened, therefore the repeat dose was not given. In 4 cases the drug was not repeated because after the first dose the patients became extremely restless and noisy.

(*d*) In the 4 *poor* cases 2 were primiparæ and 2 multiparæ; all were very nervous in temperament. The average age was 24·9 years. Two were admitted within 12 hours of delivery, and each had a single dose grs. 3 of nembutal followed by grs. 22 of chloral hydrate, 3 hours before delivery. There was no obvious cause for the failure to produce analgesia in these two cases; the pains were unaffected in strength and frequency by the drug, but the patients became more nervous as labour progressed. The remaining 2 of these 4 cases were admitted over 24 hours before delivery, and each had the usual single doses of nembutal and chloral, in each case over 5 hours before. The repeat dose of nembutal and chloral was not given because the pains were weakened after the initial dose and the patients became very noisy.

(*e*) In the 13 cases grouped as *failures* 12 were primiparæ, 1 a multipara; the average age was 29·6 years; 4 were placid in temperament, 9 very nervous; 3 were admitted to hospital within 12 hours before delivery, 5 under 24 hours, and 5 over 24 hours before delivery. In 10 of these 13 cases the usual dose of nembutal and chloral was given, in 3 cases within 3 hours, in 1 case within 5 hours, and in 6 cases over 5 hours before delivery. In 2 of the 13 cases nembutal grs. 1½ and chloral hydrate grs. 22 were repeated within 3 hours before delivery. In the remaining case the initial dose was given 10 hours before and nembutal grs. 3 and chloral hydrate grs. 22 were repeated 5 hours before delivery.

Of these 13 cases, all of which were complete failures, there were 3 in which the drugs were given too late, within half an hour of delivery. In 3 cases the repeat dose was withheld because after the initial dose the pains became weaker and less frequent. One of these cases terminated in a forceps delivery. In 5 cases the repeat dose was withheld because of the extreme lack of control and restlessness induced by the initial dose in women already hysterical.

In 2 cases no apparent cause was detected for the lack of amnesia and analgesia. Both cases were quiet and easily manageable, in both the pains continued unaffected, but both women insisted that they felt severe pain throughout. They were placid and intelligent women.

THE ATTENDANT'S POINT OF VIEW

At University College Hospital women in labour are examined in the admission-room. They are then transferred to the first-stage ward, which is capable of accommodating three women, and when in the second stage are transferred to a second-stage ward. The labour wards (second-stage wards) have only one bed. A normal labour is under the supervision of the labour ward sister only.

It was not found necessary to vary these arrangements with regard to patients under nembutal and chloral, except in the cases which were very restless. These were moved from the first-stage ward to the second-stage ward rather sooner than usual and not left alone. Those who responded well were left for a few minutes at a time. No case gave rise to particular anxiety. There was no fall in blood pressure or undue narcosis produced by the drugs. No case became maniacal. From the attendant's point of view the patients have been divided into four groups.

(*a*) *Easy to manage,* 61. These patients slept between their pains, and responded to instructions when required. They could be roused to be examined, but when left alone slept quietly. With the pains they were roused, and were rather more apt to wriggle than the usual patient without nembutal. They were not noisy, but there was a tendency to weeping and lack of control.

(*b*) *Fairly easy,* 12. These patients were drowsy between their pains, but were noisy with the pains, and could not be roused as easily to make use of the pains.

(*c*) *Difficult,* 17. The patients were noisy and restless, weeping and miserable even between the pains.

(*d*) *Very difficult,* 10. These cases were extremely noisy and restless. They required constant attention and would not respond to directions in any way.

The disposition of the patient apparently made a difference. In (*a*) 47 were placid, 14 nervous; (*b*) 6 were placid, 6 nervous; (*c*) 5 were placid, 12 nervous; (*d*) 0 were placid, 10 nervous. This statement is of course not absolute, as in the "difficult" group there were 5 patients who were placid and quiet though distressed with the pains. After the administration of nembutal and chloral they became noisy and restless. It was found, however, to be a good working rule that placid patients would respond well, and the labour ward sisters, after some experience with the drug, could foretell fairly accurately which patients would be troublesome during the second stage. At this point it is interesting to note that the disposition of the patient has apparently a definite bearing on the success or otherwise of the drug from the patient's point of view. Of the 62 successful cases from the patient's side, 40 were placid in nature and 22 nervous, while in the 17 cases in which the drug was found to be without effect 4 were placid and 13 very nervous. Further, in 5 of these 13 cases, the nervousness was made worse by the initial dose of nembutal so that the repeat dose had to be withheld. Even though a patient became restless and unhappy after her first dose of nembutal and chloral it by no means followed that the amnesia would be incomplete. One or two of the worst cases of restlessness, which were exceedingly noisy throughout, had nearly complete amnesia. "They tell me I made a noise, but I don't remember anything about it." Hence it seems fair to argue that a repeat dose given to the restless patients would have produced a certain degree of success. It was, however, impossible to give this dose because of the fear that the patients would roll off the bed; further, they could not be induced to make use of their pains.

One patient was rather more than usually sleepy next day; the others were perfectly normal. They all slept through the third stage. Chloroform or gas-and-oxygen was given for the deliveries in all cases except two, the average time of administration being about ten minutes, just for the actual predelivery pains, crowning, and birth of the head and shoulders. About ♏ 20–30 of chloroform was usually required. This amount was of course increased for forceps delivery. The number of perineal tears resulting was small. The temperature, pulse-rate, and blood pressure of the patients after delivery were apparently not affected by the nembutal and chloral.

EFFECT ON THE PAINS

In 71 cases the strength and frequency of the pains were unaffected. Labour progressed normally and delivery took place within the expected time. In 9 cases there was considerable strengthening of the pains following the nembutal and chloral, and delivery took place with some rapidity. As this occasionally happens with patients who have had no preliminary sedative it seems doubtful if the strengthening should be regarded as a direct effect of the drug. O'Sullivan and Craner, in their series of 60 cases, had 3 in which a similar strengthening was observed.

In 20 cases labour was apparently lengthened. In 7 of the 20 the frequency of the pain was diminished, the intervals between pains lengthening from about three to five minutes, or four to six minutes. In 8 the strength was diminished. In 5 both strength and frequency were diminished. Fourteen of these 20 cases terminated in spontaneous deliveries, and the lengthening of the second stage gave rise to no anxiety. Six cases terminated in forceps deliveries. Forceps were applied for weakening pains and a lengthy second stage.

In this series of 100 cases there were 10 forceps deliveries. In 6, as stated above, forceps were applied for delayed second stage owing to weakening pains, but in 4 of the 6 the membranes ruptured very early, and it seems fair to assume that labour would have been long whether or not nembutal had been given. In the remaining 4 cases there was no weakening of the pains; in 1 of them there was some disproportion and the case was a trial labour, and in 3 the position was an unrotated occipito-posterior. The average for forceps deliveries at University College Hospital is about 9 per cent.; this series, therefore, shows a slight increase. In spite of the prolonging of the labour 9 of these 20 patients had complete analgesia, 5 had fair but incomplete relief from the pain, 3 had very slight analgesia, and 3 had none at all.

EFFECT ON THE CHILD

In 79 of the 80 cases of unprotracted labour there was no anxiety with regard to the child. The babies all cried at once and were normal in every respect. In the remaining case the child was born in white asphyxia but was resuscitated fairly easily. In 16 of the 20 cases in which labour was prolonged the babies gave rise to no anxiety. In 3 of the 20 cases the following notes were made :—

Case 51.—Child slightly blue. Easily and quickly recovered. Forceps delivery under full chloroform.

Case 55.—Child slightly blue. Quickly recovered. Chloroform for delivery.

Case 99.—White asphyxia. Fairly easily recovered. Forceps delivery under full chloroform.

In one case there was a stillborn baby. Throughout labour, pains were strong but progress slow. Nembutal grs. 7½ and chloral hydrate grs. 44 were given in 15 hours, starting 21 hours before the birth of the child. The first repeat dose was given 16 hours before delivery, but before that the fœtal heart could not be heard. Extract from the post-mortem report: "Cause of death—asphyxia." It seems questionable, therefore, if the nembutal had any bearing on the stillbirth.

CONCLUSIONS

From this analysis of 100 cases it seems fair to conclude that nembutal, given in combination with chloral, is of undoubted value in labour. (1) It seemed to be of most use in placid or fairly placid women whose pains were strong and distressing; (2) it was most effective when given between 3 and 5 hours before delivery, and (3) when the patients had not been admitted more than 8–12 hours, so that labour was well established before the women had to be kept completely in bed; (4) on the other hand, it was found to be of very doubtful value in nervous or hysterical patients, both from the lack of analgesia resulting and the extreme restlessness induced.

Nembutal grs. 3 in capsules given by the mouth and followed by chloral hydrate grs. 22 as a syrup, grs. 11 to the drachm, were found to be perfectly safe. In no case, with the repeat dose (nembutal grs. 1½ and chloral hydrate grs. 22) in three hours, was there any suggestion of overdosing; indeed most of the 21 cases classed as "fair" would probably have been successful as regards analgesia if the drug had been pushed.

Without the general anæsthetic for delivery there would not have been such complete amnesia in the "very good" cases. Most people, however, agree that the worst pain is felt not when the child is actually being born, but when the head is descending through the pelvis. Therefore a considerable amount of relief could be obtained in ordinary cases without chloroform.

These results would probably be better in domiciliary midwifery, where one nurse stays with the patient all the time and where quiet and freedom from disturbance can be ensured.

EFFECT OF ADRENALINE IN CERTAIN MUSCULAR DISORDERS

By J. St. C. Elkington, M.B. Camb., M.R.C.P. Lond.
ASSISTANT PHYSICIAN TO ST. THOMAS'S HOSPITAL; AND

M. W. Goldblatt, M.D. Belf., Ph.D. Lond.
LECTURER IN PHYSIOLOGY AT ST. THOMAS'S HOSPITAL MEDICAL SCHOOL

The cause of the muscular wasting and weakness which are the outstanding symptoms of the myopathies has been the subject of much speculation since their separation by Erb from the cases of muscular wasting of nervous origin.

It is generally recognised that though they assume a somewhat varied clinical picture according to the muscle groups first affected, the age of onset, the rate of progress, and the presence or absence of pseudohypertrophy, the various sub-groups of myopathies are probably but different aspects of the same disease. An exception to this generalisation is to be made in the case of dystrophia myotonica, which, while showing features common to the other forms of myopathy, presents a picture sufficiently distinct clinically and pathologically to entitle it to be regarded as a separate entity. Equally obscure in its ætiology and pathology is myasthenia gravis, which also presents as its outstanding symptom a characteristic disorder of muscle function.

It is not proposed in this paper to discuss the merits of the numerous theories that have been put forward from time to time as to the underlying cause of the myopathies and myasthenia gravis; but there has been of recent years a tendency to attribute the muscular dysfunction to a defect in the autonomic nervous system which is known to supply the voluntary muscles through their sympathetic fibres. Direct evidence for this theory is lacking, but as the function of the sympathetic fibres to voluntary muscles is largely unknown, it cannot be summarily dismissed.

AN INVESTIGATION

The object of the investigation here reported was to determine if there is any evidence of abnormal response in the muscles to sympathetic stimulation. For this purpose the blood lactic acid and its changes after a subcutaneous injection of 1 mg. of adrenaline was used.

It is known that following an injection of adrenaline there is a sharp rise in the blood lactic acid, and that the additional lactate is derived from muscle glycogen. The mechanism of production of lactic acid from muscle glycogen by means of adrenaline is subject to some doubt. Langley's law of the identity of adrenaline and sympathetic effects would suggest that it is due to stimulation of the autonomic nerves in muscle, but it has also been suggested on experimental grounds that the stimulus acts directly on the muscle cell. Be that as it may, it seemed, a priori, possible that the disturbance of structure and function manifested in these diseases might be reflected in a defective response to adrenaline. In view of the fact that in many of these cases a large proportion of the muscular system was affected by the disease, it was not unreasonable to suppose that at least a quantitative difference in the height of the increase of blood lactate might occur.

The cases were grouped as follows:—

(a) Six control cases of male patients suffering from a variety of diseases unassociated with any known changes in the muscles.

(b) Three cases of severe progressive muscular atrophy in which advanced muscular wasting of nervous origin was present.

(c) Three cases of myopathy in which advanced muscular wasting was present, two of the Landouzy-Dejerine and one of the Erb type.

(d) Six cases of dystrophia myotonica of varying severity.

(e) Three cases of myasthenia gravis.

In all cases the clinical diagnosis appeared to be beyond dispute and the details of their states are omitted.

In addition to blood lactate, blood-sugar was estimated in capillary blood. This was done firstly as an index of the glycogenolytic response in the liver, and secondly because it has been asserted at various times that muscle diseases are associated with disturbances of carbohydrate metabolism. The blood-sugar was determined by MacLean's method, and the blood lactate by that of Friedmann, Cotonio, and Shaffer.

The patient was given a light breakfast (tea without sugar and toast) between 7.30 and 8 A.M., and the experiment was commenced at about 10.30 A.M. Blood for blood-sugar was taken from the capillaries of the finger, and that for blood lactate from the median basilic vein without stasis, no anticoagulant being used. Having taken the pulse, 1 mg. adrenaline hydrochloride was injected subcutaneously. In all cases a marked rise in pulse-rate occurred, accompanied by pallor, palpitation, and slight subjective distress. Blood samples were taken at hourly intervals, for three hours, the patient in the intervals being kept at complete rest either in bed or in a wheel chair.

The results obtained are classified in the accompanying Table, and only averages for each group are given. Blood lactate and blood-sugar are both given in mg. per 100 c.cm. Figures in parentheses are rises above initial levels.

Averages of Blood Lactate

Time after adrenaline	Controls.	Dystrophia myotonica	Progressive muscular atrophy.	Myasthenia gravis.	Other myopathies
Hour	6 cases	6 cases	3 cases	3 cases	3 cases
0	19	18	15	14	18
1	31 (12)	23 (5)	26 (11)	27 (13)	25 (7)
2	24 (5)	21 (3)	18 (3)	17 (3)	18 (0)
3	19 (0)	14 (–4)	15 (0)	13 (–1)	15 (–3)
Averages of Blood-sugar					
0	84	93	110	74	82
1	148 (64)	132 (39)	130 (20)	152 (78)	123 (41)
2	144 (60)	133 (40)	162 (52)	127 (53)	125 (43)
3	108 (24)	114 (21)	115 (5)	71 (–3)	79 (–3)

In the group of progressive muscular atrophy is included one very severe case, in the last stages of the disease, which gave no rise in blood-sugar after adrenaline, but the rise in lactate was of the type shown in the averages for this group. Probably this was due to almost complete depletion of liver glycogen. The blood-sugar values in this case were omitted from the averages, but the lactate values were included.

SUMMARY OF RESULTS

1. In all the cases a definite rise in blood lactate occurred, but quantitatively there were certain suggestive differences in the various groups. The controls and the cases of progressive muscular atrophy and myasthenia gravis gave almost identical responses —viz., a rise of 11–13 mg. per 100 c.cm. in the first hour, a still definite rise of 3–5 mg. after two hours, and a return to initial values at the end of three hours. In the cases of dystrophia myotonica and other myopathies, the rise in lactate was 5–7 mg. per 100 c.cm. after one hour, and after two hours it was only 0–3 mg. After three hours the values were below the initial.

2. The hyperglycæmia in the controls and cases of dystrophia myotonica, whilst of different proportions, continued for three hours, at which time the blood-sugar was 21–24 mg. per 100 c.cm. higher than the initial values. In all the other cases the hyperglycæmia was of shorter duration, although no important difference in the maximum rises was detected.

3. The resting lactic acid in the blood of all the cases was within normal limits. The resting blood-sugar in the cases of myasthenia gravis was lower than in any other group.

No theoretical conclusions can be drawn from these findings at this stage of our investigations, and our object in presenting them has been to draw attention to the fact that such quantitative aberrations from the normal as do occur in the blood lactate response are present only in the cases of dystrophia myotonica and the myopathies.

This work was done during the tenure by one of us (J. St. C. E.) of the E. G. Fearnsides research scholarship of the University of Cambridge.

THE CLINICAL MANIFESTATIONS OF
HYPOCALCÆMIA IN RENAL FAILURE[1]

By T. Izod Bennett, M.D., F.R.C.P. Lond.

PHYSICIAN, WITH CHARGE OF OUT-PATIENTS, MIDDLESEX HOSPITAL; PHYSICIAN TO THE ROYAL NATIONAL ORTHOPÆDIC HOSPITAL

When for any reason the function of the kidney becomes sufficiently impaired to produce nitrogen retention in the blood a diminution in the serum calcium also becomes apparent. Many authorities have commented on this hypocalcæmia—de Wesselow, Salvesen and Linder, Marrack and Thacker, Schmitz, Izod Bennett, and others. The serum calcium is also reduced in those cases of renal disease without nitrogen retention which are now usually grouped together as "nephrosis." In my own experience of this somewhat rare condition I have observed hypocalcæmia on several occasions, and similar findings have been reported by Achard and Ornstein, Scriver, Salvesen and Linder, Peters and Eiserson, and others. The hypocalcæmia of nephrosis is probably an effect of the diminution of the plasma proteins which is constantly present in this condition.

But the hypocalcæmia of renal insufficiency is an entirely different type of biochemical phenomenon. It is much commoner, much more marked, and is due to quite different causes. Table I. illustrates the condition :—

TABLE I

Case.	Urea.	N.P.N.	Ca.
A. B.	50	46	8·7
C. D.	150	87	7·1
E. F. (*a*)	200	120	7·6
E. F. (*t*)	450	240	6·0
G. H.	525	300	8·4
I. J.	620	335	7·3
K. L.	380	200	6·4
M. N. (*a*)	66	50	9·7
M. N. (*t*)	215	130	5·7
O. P.	170	98	9·5
Q. R.	340	195	7·7

(*a*) on admission ; (*t*) terminal.
N.P.N. = non-protein nitrogen.

This table demonstrates hypocalcæmia in every case, and often of severe degree, and although these are selected cases chosen to illustrate this paper it will be found, whenever a group of patients with considerable nitrogen-retention is examined, that with very few exceptions the blood calcium is considerably reduced. This fact immediately raises two important questions : (1) in what manner is the reduction of the blood calcium produced ; and (2) are any of the symptoms of renal insufficiency directly attributable to this particular chemical phenomenon ?

CAUSATION OF HYPOCALCÆMIA IN RENAL INSUFFICIENCY

No completely satisfactory explanation of the hypocalcæmia of renal insufficiency is possible at the present date. Many observers such as Marriott and Howland and de Wesselow have considered it to be an effect of the accumulation of phosphorus in the blood, and it is quite certain that in terminal renal failure it is usual to find the increase in the blood phosphorus running somewhat parallel to the diminution in the blood calcium. Table II. taken from my own cases is illustrative of this :—

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[1] A communication read to the Congrès de l'Insuffisance Rénale, Evian, France, in September, 1933.

TABLE II

Case.	Urea.	Ca.	Phos.
K. L. ..	380	6·4	12·0
	260	9·0	8·7
E. F. ..	150	7·6	5·9
	450	6·5	17·5
G. H. ..	525	8·4	15·6
I. J. ..	620	7·3	11·4

At the same time careful inquiry by many biochemists has not led to the general acceptance of the theory of phosphorus retention as being an altogether sufficient explanation of hypocalcæmia. Another explanation frequently offered is that the hypocalcæmia is an effect of acidosis. It is known that any notable diminution in the alkali reserve of the blood is accompanied by a reduction in calcium. It is also well known that many cases of renal failure are accompanied by a considerable acidosis. But many exceptions to this rule are found, and I have frequently observed cases of early renal insufficiency with hypocalcæmia well marked but with the alkali reserve of the blood remaining fully normal; further, it must be noted that it is often possible to restore the alkali reserve to normal for long periods without in any way abolishing hypocalcæmia. The observations of Weil and Guillaumin and of Mogena and Orcoyen support this view. The factor of acidosis must, however, be constantly remembered because its appearance in the late stages of renal insufficiency may convert a pre-existing mild hypocalcæmia into a severe one. This aspect of the problem is further discussed below.

Certain workers, such as Ambard, might seek to explain the hypocalcæmia of renal insufficiency as an effect of "dry salt retention." I am unable, from personal investigation, to support or refute this theory because up to the present I have never observed changes in the blood chlorides which would suggest that salt retention offers the correct explanation.

As regards the blood pressure, it has long been known that extreme hypertension frequently accompanies renal insufficiency, but observations on this subject, particularly in England and America, demonstrate that pure hypertension, without evidence of renal involvement, is not accompanied by any alteration in the calcium content of the blood. Similarly, it is doubtful whether nitrogen retention alone creates hypocalcæmia because many cases of obstruction to the urinary tract, such as prostatic obstruction, are accompanied by considerable nitrogen retention often without marked lowering of the calcium content.

SYMPTOMS POSSIBLY DUE TO ABNORMAL CALCIUM METABOLISM

It would seem difficult, in the absence of exact knowledge as to the mechanism of the production of hypocalcæmia, to answer with any certainty the question whether any of the symptoms of renal failure are attributable to disturbances of calcium metabolism. At the same time careful observation suggests that there are, amongst the manifold symptoms of renal failure, certain ones which can properly be ascribed to the changes in the blood calcium.

Amongst such symptoms are those in which the patient suffers from muscular cramps. The following is a striking example :—

S. T., female, aged 43, seen by me on Feb. 24th, 1932. Patient had been a very healthy woman; had had two normal pregnancies, the youngest child being now 12 years old; she had never had œdema or other medical complications of pregnancy. She was an athletic woman who played games of all sorts. In June, 1931, she noticed slight cramps in her arms and in her feet whilst playing golf. These continued rather frequently, but it was not until the middle of January, 1932, that they became so severe as to interfere with her game; at the same period she noticed herself a little breathless at the end of a round of golf.

On the following day, whilst paying a call, the cramps became very severe, particularly in the thighs; she was just able to get home and to bed; the adductor muscles of the thighs were hard and painful with spasm which did not pass off for some hours and then left the legs very tender, actual bruises appearing three days later. These severe cramps continued for some days, so affecting the abdominal muscles as to make her vomit.

Her blood pressure was found to be above 200, and a considerable quantity of albumin was present in the urine. Calcium gluconate given by mouth with rest in bed quickly relieved the cramps which became minor in character. There had been some nocturnal polyuria ever since birth of second child, but she had never had headaches, and there had been no gastro-intestinal upset apart from the vomiting caused by the abdominal cramps. A specimen of blood taken 10 days previously showed the blood-urea to be 160, and calcium below 7·0.

When consulted I instituted a severe low nitrogen diet and the following figures give the course of the case :—

—	Feb.	Mar.	April.	May.	July.	Sept.
N.P.N... ..	97	63	57	69	76	87
Urea	158	85	82	88	130	150
Calcium. ..	8·5	8·4	9·4	7·7	7·8	7·1
Phosphorus ..	5·6	—	—	6·6	7·3	8·6
Alkali reserve..	—	—	—	—	—	51
Notes ..	Cramps less*	—	Cramps gone.	—	—	Cardiac failure†

* B.P. 200/120. † B.P. 220/130.

The patient died of cardiac failure and pulmonary œdema; there were no cramps during the last three months of life.

Such cases are by no means common, but milder degrees of cramp in the large muscles are often observed by the careful clinician, and it is probable that the twitching of the extremities, unaccompanied by pain, which is so often seen in one group of uræmic patients, is only another manifestation of hypocalcæmia. It will further be observed that an exaggeration of the tendon reflexes often becomes more and more noticeable as renal failure progresses towards uræmia, and here again it would seem that hypocalcæmia is an important factor in the production of this phenomenon. The following is an example of this :—

E. F., male, aged 29, consulted me at Middlesex Hospital in January, 1922. Three weeks previously he had had some pain in the chest and back for 12 hours and seven days later complained of a "rushing" feeling in his head. Beyond this he had no symptoms. On examination heavy albuminuria, no œdema, normal retinæ, no gastro-intestinal symptoms. No cardiac enlargement, B.P. 170/105. Blood analysis: urea, 165; N.P.N., 133; Ca., 6·7; phos., 7·0. Plasma-proteins: alb., 3·32; glob., 2·53; fibr., 0·31. Wassermann, negative. The patient reported twice weekly for three months, during which time he remained at work on a diet consisting exclusively of fruit. The tendon reflexes were markedly exaggerated, and in view of the low blood calcium he was given full doses of calcium lactate, calcium gluconate, and sufficient bicarbonate of soda to maintain the alkali reserve. By April there was a rapidly increasing hypertension, B.P. 190/110, nitrogen retention increasing, calcium remaining at about 6·0. The patient complained of occasional cramps in the limbs. In May he was admitted to the wards, retinal hæmorrhages appeared, nitrogen retention steadily increased, and death occurred at the end of June. Vomiting and coma occurred at the terminal period, there was no cardiac failure, convulsions only appeared in the last hour of life. Tendon reflexes were markedly increased throughout his illness. Autopsy showed small sclerotic kidneys.

The *terminal convulsions* of uræmia must also be studied when assessing the importance of calcium changes in nephritis, though it is not suggested that such convulsions are usually or even frequently related to this particular chemical factor. It is well known that such convulsions may occur in cases of primary hypertension without any evidence of renal failure at all, and I subscribe to the doctrine, which has been so lucidly enunciated by Fishberg of New York, that such convulsions may properly be described as "hypertensive encephalopathy." They are essentially an expression of an alteration in the cerebral circulation which accompanies changes in the blood pressure. But, putting this in other terms, is it not thereby implied that such convulsions are in reality a manifestation of cerebral asphyxia, and most probably represent oxygen-shortage in the brain? I suggest that in cases where there is coexisting hypocalcæmia, such asphyxial phenomena will be far more readily produced than in others. The following is an example :—

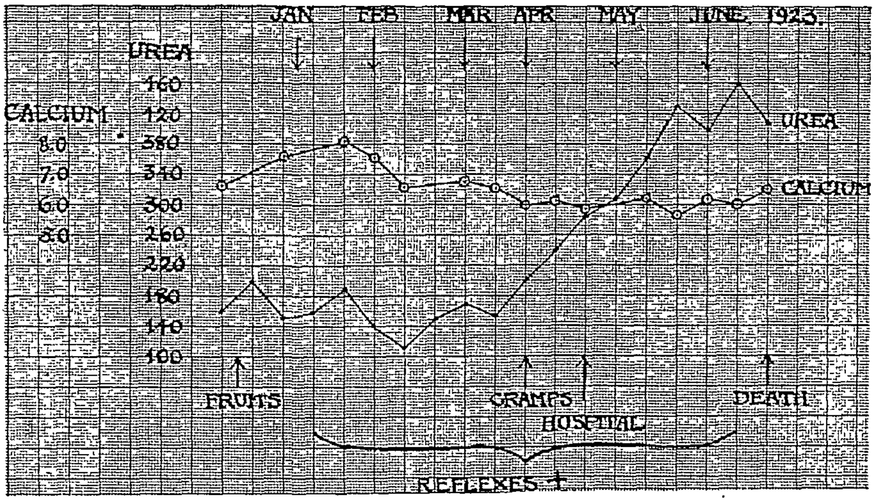

CHART I.—Graph to show progressive renal failure in a patient (E. F.) aged 29. Hypocalcæmia treated by full doses of calcium lactate from outset.

U. V., male, aged 11, admitted to the neurological ward, Middlesex Hospital, under the care of Dr. D. McAlpine, in April, 1933. In the month prior to admission he had had several attacks of violent convulsions with twitching of the left side of the face and followed by stiffness of the limbs. He had not complained of headache or pain. On admission there was no cardiovascular change except that on some occasions the blood pressure, which was closely observed almost hour by hour, was definitely somewhat elevated for a boy of 11; at such times the diastolic pressure was 100 and the systolic as high as 160. At other times the diastolic was 95 and systolic 130. The tendon reflexes were exaggerated, Chvostek's sign was positive, and there was a heavy cloud of albumin in the urine. Lumbar puncture showed the cerebro-spinal fluid to be under pressure; its chemistry and cytology were normal. There was definite bilateral papillœdema. Blood examination showed urea, 400–500; N.P.N., 220–260; phosphates, 9·6; calcium, 4·8. The patient remained in a state of latent tetany with occasional violent convulsions, vomiting, and epistaxis. After four days he died and was found at autopsy to have a large right-sided hydronephrosis with extreme atrophy of the left kidney.

It will be noted that in the above case latent tetany was present. In previous communications I have already emphasised the analogy between this condition and uræmia. Peters is of opinion that the occurrence of frank tetany in renal disease is probably always associated with severe alterations in the alkali reserve, particularly with alkalosis. This conclusion may very likely prove to be correct, but it is probable that marked hypocalcæmia, a direct result of renal insufficiency, is the invariable precursor of the actual occurrence of tetany.

It does not seem possible to escape from the conclusion that the hypocalcæmia of renal insufficiency is often responsible for an increased irritability of the central nervous system, and that such symptoms as muscular twitchings, muscular cramps, convulsions, and occasionally tetany are outstanding clinical manifestations due to this chemical change.

RENAL RICKETS, RENAL DWARFISM, AND RENAL INFANTILISM

But if we wish to see the most dramatic effects of calcium disturbance in nephritis we must look amongst subjects suffering from chronic renal insufficiency and also in such circumstances that disturbance of calcium metabolism will naturally tend to become apparent. Such conditions are essentially met with if we study children, still in the growing period, and suffering from chronic nephritis.

In 1883 a British physician, R. C. Lucas, first described the association of adolescent rickets with albuminuria. The occasional association of nephritis in children with growth defects was noted by various observers in subsequent years, but the full recognition of the condition was made by Morley Fletcher in 1911. Since then the subject has received considerable attention, particularly in England and in America, the principal writings on the subject being those of Parsons, Barber, Paterson, Mitchell, and Ellis and Evans.

Three types of disturbance of bodily development with renal defects occur, either separately or associated with one another. These are renal dwarfism, renal infantilism, and renal rickets. Taking them as one group it is found that the condition is of fairly frequent occurrence in England. Ellis and Evans have collected 20 cases from the London Hospital; Barber in 1926 collected a series of 17 cases and has since made observations on several more; over 80 cases have been published in the literature, and the writer, without making special search to collect cases, has observed more than 12 during the last five years. At the Middlesex Hospital, London, I have been able to make full observations on some of these cases, but many more have been seen at the Royal National Orthopædic Hospital.

It is not my purpose here to give any full description of the clinical manifestations of renal rickets beyond pointing out that the bony changes may come under observation quite early in life during the first decade, but are still more often seen in adolescence, so that it has come to be recognised, in London and the country immediately surrounding it, that chronic renal disease is probably the commonest cause of that somewhat rare condition, adolescent rickets. In certain cases the bony deformities may be very conspicuous, but usually the case is observed merely as one of severe genu valgum. In others, infantilism, or dwarfism, without marked deformity of the bones, may be more conspicuous. Such cases rarely survive beyond the age of 20, renal insufficiency becoming gradually more severe and terminating in uræmia. Notable clinical facts are that hypertension is usually absent, and there is frequently no evidence as to the ætiology of the renal lesion. In cases where rickets is conspicuous the X ray appearances of the bones are characteristic, and radiologists with special experience in this class of work are often able to diagnose the condition by X ray examination alone.

The morbid anatomy presents great difficulties. The kidneys are invariably sclerosed, with considerable increase in the interstitial tissue and destruction of the glomeruli, but lack many of the characteristic features of chronic nephritis of infectious origin. There is usually no history to explain the onset of the disease. In a few cases the patient has been the victim of an acute streptococcal nephritis following scarlet fever or other infectious diseases; Brockman, Cockayne, and Lee Lander have described cases of this type, and one has been under my care in the Middlesex Hospital for a long time, particulars of this latter being as follows:—

W. X., female, aged 19½. At the age of four had scarlet fever with nephritis definitely diagnosed in fever hospital. Health fairly good until age of 11 when marked genu valgum developed. No œdema. Normal cardiovascular system. Constant slight albuminuria. Retinæ normal. Treated with full doses of calcium lactate and cod-liver oil, and legs straightened by callipers; she is now, at the age of 19½, very well and working in a shop; she trained to become a ballet dancer, but abandoned this ambition on account of parental objections.

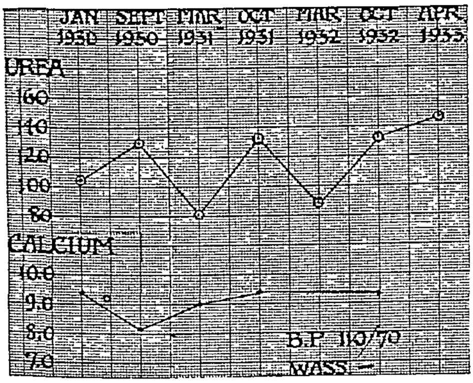

CHART II.—Case of renal dwarfism in a patient (W. X.), aged 19½, following nephritis in infancy

It must, however, be accepted that nephritis of infective origin is seldom demonstrable as the cause of this condition; Mitchell, in an exhaustive inquiry into chronic nephritis in childhood, found only two examples with such an ætiology.

COMMENTARY

I would, however, conclude this paper by directing attention to certain recent observations which suggest that this problem of the ætiology of chronic nephritis in children may become less obscure as the result of future research; in Queensland it has been observed by Croll and Nye that chronic nephritis occurs amongst children with greater frequency than in any other part of Australia, and probably than in almost any other part of the world. These investigators have made close study of a large series of children, usually adolescents with general debility, pallid and wizened features, stunted physical development, and very marked hypertension. Retinitis is a frequent occurrence amongst them, and uræmia or hypertensive disasters usually terminate their existence before adult life is reached. Biochemical investigation reveals marked renal insufficiency. In their search for the explanation of this curious state the Australian doctors noticed that another condition was also very prevalent in Queensland amongst children—namely, lead poisoning. Until recent years a number of children were admitted annually to the hospitals of Queensland suffering from neuritis, gastro-intestinal disturbances, and the other classical manifestations of plumbism. The explanation is a curious one; Queensland is a very hot country where rain occurs very seldom, and the people inhabit painted wooden houses surrounded by verandahs. Owing to the heat the paint dries and crumbles, and when on rare occasions there is a fall of rain, the children, delighted by this unusual spectacle, run out and lick the raindrops off the pillars of the verandahs. The result is lead poisoning. During his investigation into the cause of chronic nephritis in children, Nye noted that nearly all the subjects whom he observed had been nail-biters during early childhood, and had inhabited wooden houses with verandahs such as I have described. Their condition was exactly that seen as the late result of lead poisoning. He proceeded to investigate a series of children, not complaining of any disease, but who had been known to have suffered from lead poisoning some years previously. He found that in every single case such children had marked hypertension, slight albuminuria, and biochemical proof of advancing renal insufficiency.

I bring this matter to notice not with the suggestion that it offers a clue to the ætiology of renal rickets in England, because hypertension, which is very marked in lead poisoning and in the Queensland cases, is practically never seen in renal dwarfism in Great Britain; but the Australian observations are *important as an illustration* of how an unsuspected factor may produce chronic nephritis almost in epidemic proportions.

The other recent observations which seem specially important are those of Ellis and Evans. Investigating a large series of renal dwarfs at the London Hospital, these observers noted that in the post-mortem records of past cases, and in post-mortems made on cases under their own observation, dilatation of the urinary tract was often prominent. Urinary retention appeared to occur from the level of the urethro-vesical sphincter upwards. No obvious lesion could be demonstrated in this region, and a disorder of the neuromuscular mechanism is suggested as an explanation. In further support of their hypothesis they produced evidence of dilatation of the ureters and of the pelvis of the kidneys in several cases during life. Here again we have another possible explanation of a condition in which the ætiology is still obscure.

In conclusion, it may be said that although the origin of renal rickets remains obscure, and although the causation of hypocalcæmia in all cases of renal insufficiency is still somewhat of a mystery, we cannot ignore the importance of this hypocalcæmia, and it seems probable that it is responsible for certain striking symptoms and physical changes to be observed in chronic nephritis both in children or in adults.

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EXPERIMENTS ON THE ALLEGED CANCER-PRODUCING QUALITIES OF TOMATOES

BY M. J. A. DES LIGNERIS, M.D. BERNE,
L.M.S.S.A. LOND.

(*From the South African Institute for Medical Research, Johannesburg*)

THE tendency to seek an ætiological factor responsible for cancer formation amongst the organic and inorganic constituents of human and animal food or amongst the various impurities which may be found in such foodstuffs is not new. Many food products of the most various kinds have been incriminated. This fact alone renders it a priori extremely improbable that, generally speaking, any particular foodstuff in itself should play any part at all in the causation of cancer. But it must be conceded that two elements connected with food may perhaps have a contributory rôle:

1. The contamination with certain parasites of an animal or vegetable nature (this in view of the frequency of certain animal cancers when particular parasites are present).

2. The varying constitution of certain foodstuffs, this variation being, partly at least, associated with varying soil constituents. Thus several workers (mostly French) have tried to relate a frequent occurrence of cancer with a mineral imbalance of the soil (magnesium-calcium-potassium). A diminution of the magnesium content of soil and vegetables, automatically followed by an increase in potassium, is said to stimulate cancer formation, whilst a soil (and vegetables) rich in magnesium and concomitantly poor in potassium—such as is found, for example, in Egypt—is said to be unfavourable for cancer formation. To what extent these assertions are justified will probably be shown by extensive research work and scientifically satisfactory statistics.

Tomatoes (which had already been incriminated) have recently been found by Bellows and by Askanazy (in Geneva) to have the property of causing a rapid development of peritoneal sarcoma in a very high percentage of white rats. These animals were injected intraperitoneally with tomato juice or with killed cultures of a *subtilis*-like bacillus which had been obtained from the interior of tomatoes. Sarcoma of the peritoneum was even produced by giving tomato juice per os with the ordinary food. The picture produced by this treatment with tomato juice or by the bacillus just referred to was that of an extensive sarcomatosis of the peritoneum, the latter being covered with innumerable tumour nodules varying in size from a pinhead to that of a small apple (weight 30 g.); no real metastases were, however, formed. Both the description and the photographs produced seem to make it certain that these tumours (which could be grafted into new animals) were true sarcomas.

In view of the importance of the subject it was thought that far-off South Africa with its local tomatoes would be a suitable country to initiate control experiments. With one exception, where a *subtilis*-like organism was obtained from a tomato, all the tomatoes used were found to be bacteriologically sterile internally.

Twenty-eight white rats and 78 white or piebald mice were used for the experiments.

RATS

In a first series 8 rats were injected every third day intraperitoneally with 4 c.cm. tomato juice each, until every rat had received ten injections. After a rest of seven weeks (no tumour or "resistance" of any kind being felt) six more injections were given to each animal, with weekly intervals. Apart from one rat which died from peritonitis the animals remained healthy and did not develop tumours.

In a second series 4 rats received a mixture of tomato juice and siliceous earth intraperitoneally. Small granulomas formed around the injected material, but after three months no sarcoma had developed. The rats then received six more injections, of tomato juice only, at weekly intervals. Three months after the last injection no rat had developed a tumour.

In a third series 2 rats received intraperitoneally killed cultures of the *subtilis*-like organism which had been obtained from one of the tomatoes. Eight injections were given, with intervals of three or four days. No sarcoma developed; after a rest of seven weeks another series of three injections was given, at weekly intervals, consisting of tomato juice plus living cultures of the *subtilis*-like organism. A few days after the third injection both rats died of general peritonitis; there was no trace of tumour formation.

Another series of 2 rats was given *subtilis*-emulsion plus siliceous earth (one intraperitoneal injection per animal). Though the same emulsion was used as in the first injections administered to the rats of the previous batch (which injections apparently did no harm to the animals), the adding of siliceous earth altered the conditions, and both rats were found dead on the day following the injection.

Another 2 rats were given single intraperitoneal injections of rat embryo pulp. Nothing developed, not even a palpable teratoma.

Another 2 rats were injected once intraperitoneally with rat embryo pulp plus siliceous earth; only small granulomas formed. Four other rats were injected once intraperitoneally with rat embryo pulp plus siliceous earth plus tomato juice. Here, again, siliceous nodules only formed in the abdomen.

Finally 4 rats received single intraperitoneal injections of rat embryo pulp plus siliceous earth plus tomato juice plus *subtilis*-emulsion (obtained from a tomato). Here, again, only granulomas formed.

MICE

Intraperitoneal injections were made into 38 mice as follows: Two with 0·5 c.cm. each of siliceous earth in saline suspension. Two with 0·5 c.cm. each of *subtilis*-

emulsion in saline. Two with 0·5 c.cm. each of siliceous-earth suspension plus 0·5 c.cm. of *subtilis*-emulsion. Two with 0·25 c.cm. each of siliceous-earth suspension plus 0·25 c.cm. of *subtilis*-emulsion. Ten with 0·5 c.cm. each of tomato juice. These injections were repeated four times (at four-day intervals). Ten with 0·5 c.cm. each of tomato juice plus siliceous-earth suspension (once only). Ten with 0·5 c.cm. of tomato juice plus siliceous-earth suspension plus *subtilis*-emulsion (once only).

Most of these mice died, apparently as a consequence of the treatment. Nine survived for three months; none had formed a tumour.

Forty mice were inoculated partly intradermally and partly subcutaneously in the dorsal region, and otherwise treated as follows:—

Ten mice received injections of 0·5 c.cm. tomato juice. These injections were given every three to four days for eight weeks, 17 injections being given in all; then, after a rest of three weeks, another series of 8 injections was given at weekly intervals. Three months after the cessation of treatment none of the surviving mice had any tumour; some had had abscesses.

Ten mice received injections of 0·5 c.cm. tomato juice plus *subtilis*-emulsion (bacilli killed, spores alive). These injections were given and repeated in exactly the same way as in the previous batch of ten mice, which received tomato juice only. Three months after the last injection no mouse had a tumour. They all had local abscesses.

Ten mice were injected with tomato juice only, but immediately afterwards they were painted with English tar in the same region on a surface of approximately 1 cm. square. This combined treatment was given twice a week for a period of eight weeks. Then, as several mice had died and the surviving ones had numerous abscesses in their skins and subcutaneous tissues, they were only painted with tar, no injections being given for four weeks. The painting was done twice a week. During a subsequent period of two months the mice were again injected with tomato juice into the skin of the back, but once a week only, whilst they were painted twice a week with tar. During that period papillomas made their appearance. Three months after cessation of treatment four mice survived. They had papillomas, but no epitheliomas; whilst several mice in former experiments, not described here, which had received tar treatment but without tomato juice, had at that time definite epitheliomas.

Finally, ten mice were injected with tomato juice plus *subtilis*-emulsion and then painted with tar as in the previous batch. The mode of injections and painting was exactly the same as described for the previous batch. At the end of the treatment three mice were left; they had papillomas; one of them was developing an epithelioma. But, as already stated, control mice which had received ordinary tar painting only also showed epitheliomas.

From these experiments it can well be concluded that neither the tomato juice nor *subtilis*-culture products caused tumour formation in rats or mice, and that, in combination with tar painting, tomato juice and *subtilis* did not hasten the formation of tar cancer in mice.

These negative results have been confirmed by other control investigators (Collier and Jaffe, Fischl and Kussat, Larionow, Pawlowa, and Schabad). Curiously enough, Askanazy himself subsequently reported that, while continuing his tomato experiments, he could obtain no further positive results in his white rats. His positive results had been obtained mostly with African tomatoes, while in the subsequent negative experiments European tomatoes were used. Askanazy can offer no explanation for the change in results.

Taken as a whole, our and other workers' negative results, as well as Bellows's and Askanazy's positive results, suggest that the presence or absence of an inherent constitutional factor in the experimental animals is of paramount importance. If this factor is present, it is easy enough to produce true tumours by means of any chronic irritation of adequate severity and duration; but if this factor is absent, unspecific irritations, like that caused by tomato juice injections, elicit no true neoplastic response.

SUMMARY

Askanazy and Bellows's successful production of peritoneal sarcoma in rats by means of tomato juice injections could not be repeated. Neither in rats nor in mice did a single case of sarcoma occur; nor did the sub- or intra-cutaneous tomato juice injections into mice, when added to tarring, hasten the formation of skin tumours.

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THE TREATMENT OF
PULMONARY TUBERCULOSIS BY GOLD

A RECORD OF FIFTY CASES

BY W. V. CRUDEN, M.R.C.S. ENG.

LATE ASSISTANT MEDICAL OFFICER, THE ROYAL NATIONAL HOSPITAL FOR CONSUMPTION, VENTNOR

"Surely there is . . . a place for gold" (Job xxviii. 1).

THERE is still some doubt about the value of gold treatment in pulmonary tuberculosis. Whilst such observers as Gravesen[1] and Stub-Christensen[2] are convinced that it is very useful in suitable cases, others remain either sceptical or definitely opposed to its use.[3] Hence it seems that the publication of further records is desirable. The following series of 50 cases was taken from men patients at the Royal National Hospital for Consumption, Ventnor.

Adopting the L.C.C. classification, 1 (2 per cent.) belonged to Class A (T.B.—). The rest came into Class B (T.B.+), and consisted of 3 (6 per cent.) belonging to Group I., 28 (56 per cent.) to Group II., and 18 (36 per cent.) to Group III. For purposes of comparison 50 consecutive cases treated without gold are also considered. These latter were, on the whole, patients with a slightly more favourable prognosis than the former; 9 (18 per cent.) of them belonged to Class A, and of the remainder (Class B) 2 (4 per cent.) belonged to Group I., 30 (60 per cent.) to Group II., and 9 (18 per cent.) to Group III. Only one patient treated with gold had an artificial pneumothorax, whereas 20 of those untreated with gold had some form of collapse therapy.

The gold injections were begun for a variety of reasons: large amounts of sputum remaining "T.B. positive"; failure to improve, or insufficient improvement, under ordinary sanatorium régime; or acute spread of the disease. The selected case was first tested for the presence of albuminuria, and if this was absent the intravenous injections were commenced. The first dose given was very small (usually 0·025 g.), and at weekly intervals the injections were continued unless complications ensued. The usual course with Sanocrysin and Crisalbine consisted of 0·025 g. twice, 0·05 g., 0·1 g. twice, 0·25 g. twice, 0·5 g. twice, 0·75 g. twice, and 1 g. twice, making a total of 5·3 g. Ten of the cases received sanocrysin and 38 crisalbine. The remaining 2 were given Solganal in total doses of 1·85 and 1·9 g. respectively. If the general condition of the patient was sufficiently good, he was allowed to continue ordinary sanatorium exercise or work during the course and was only confined to bed for the remainder of the day after each injection. The urine was tested after each dose, and the patient instructed to report at once if he noticed any rash or sore-throat. In this way, as far as possible, complications were noted as soon as they occurred.

RESULTS OF TREATMENT

The results obtained are shown in Table I. The figures refer to the number of cases. The data suggest that the administration of gold diminishes the amount of sputum and tends to bring about the disappearance of tubercle bacilli. Since the cases treated by gold were, on the whole, poorer material (if one may use the phrase) than those untreated, it appears that the general condition of the patient is also more benefited by this form of treatment than without it.

TABLE I.—*Results of Treatment*

—	Number and percentage of—	
	Cases treated with gold.	Cases not treated with gold.
Sputum increased	4 (8)	7 (14)
„ unaltered	14 (28)	24 (48)
„ diminished	25 (50) } (64)	16 (32) } (38)
„ disappeared	7 (14)	3 (6)
Sputum showing increase in T.B.	2 (4)	1 (2)
„ becoming T.B. positive	3 (6)	3 (6)
„ remaining T.B. „	18 (36)	18 (36)
„ showing decrease in T.B.	5 (10) } (46)	3 (6) } (26)
„ becoming T.B. negative	18 (36)	10 (20)
„ always T.B. negative ..	4 (8)	15 (30)
General condition worse ..	6 (12)	4 (8)
„ „ improved ..	44 (88)	46 (92)
Temperature increasing ..	5 (10)	3 (6)
„ decreasing ..	26 (52)	18 (36)
„ normal throughout	19 (38)	29 (58)
Weight less	7 (14)	7 (14)
„ increased	43 (86)	43 (86)

More favourable results were obtained in those uncomplicated cases in which larger doses could be given (Table II.). Where, as a result of some complication, the treatment had to be abandoned before a total of 1 g. had been administered, the results were *not so good*. The following figures, expressed in percentages, show the difference in results obtained in 10 cases receiving less than 1·0 g., and 30 cases receiving more than 2·5 g. of crisalbine or sanocrysin. Complications appeared after very small doses as well as after larger amounts. There was no marked difference between the results obtained with sanocrysin and those with crisalbine.

TABLE II.—*Results of Larger Doses*

—	Percentage of cases receiving—	
	Less than 1·0 g.	More than 2·5 g.
Sputum diminished	50	60
„ becoming T.B. negative	20	50
General condition improved ..	60	96

The cases which responded best to the treatment were those belonging to Groups B I. and II.; 96 per cent. of these improved in their general condition and in over 50 per cent. the sputum became negative. Improvement was specially marked in those cases in which a recent subacute spread of the disease had occurred. Group III. cases, with extensive bilateral disease and excavation, did not react so favourably, as only 72 per cent. of these showed improvement in the general condition and in only 15 per cent. was the sputum rendered negative. Six Group III. cases with severe toxæmia, which showed no sign of improvement under routine treatment, received gold. Five out of the six patients were definitely worse after the treatment. In one case an acute exacerbation of the disease followed the administration of only 0·025 g.

COMPLICATIONS

Complications following the administration of the drug were noted in 70 per cent. of patients undergoing treatment. Although *in the majority* of cases the symptoms were extremely mild (such as slight fever, slight malaise, or rather vague so-called "rheumatism"), in a few patients more severe reactions were noticed. Table III. shows the complications which occurred in this series, and the number of cases affected.

TABLE III.—*Complications*

Fever	10 (20 per cent.)	—
Rash	10 (20 per cent.)	Occurred after only 0·25 g. as well as after larger doses (e.g., 5·3 g.).
Stomatitis ..	6 (12 per cent.)	All six cases had over 2·5 g. One developed a mild attack of parotitis.
Malaise and metallic taste	6 (12 per cent.)	—
"Rheumatism"	6 (12 per cent.)	An attack of gout in a patient subject to this complaint occurred after 0·1 g. No further attacks were seen for the rest of the course.
Gastro-intestinal symptoms ..	3 (6 per cent.)	Transient vomiting and/or diarrhœa.
Albuminuria ..	2 (4 per cent.)	Both patients had over 2·5 g.
Nerve lesions ..	2 (4 per cent.)	Sciatica and Bell's palsy.
Syncope ..	2 (4 per cent.)	Both patients had solganal.
Purpura ..	1 (2 per cent.)	—
Jaundice ..	1 (2 per cent.)	—

The rash usually took the form of a slight, itching, papular eruption appearing especially on the arms and face, and disappearing within about a week if the drug was immediately discontinued. In certain cases the *intravenous injection of Ametox (sodium thiosulphate)*, in doses of 0·6 g., repeated at intervals of a day or two, definitely relieved the itching (and indeed may be of benefit in other complications). It is interesting to note that in this series a skin rash and a stomatitis were never seen together. In one patient the rash developed into an acute exfoliative dermatitis, and was accompanied by such unusual symptoms as to merit special mention.

This patient had extensive bilateral lung disease and a tuberculous larynx. Under ordinary sanatorium treatment his general condition had improved, but he still had a considerable amount of T.B. positive sputum. A course of sanocrysin was accordingly started. After a total of only ½ g. had been given, a rash was noticed which rapidly developed into an acute exfoliative dermatitis involving the whole body. This was followed by the appearance of widespread petechiæ, epistaxis, and profuse hæmaturia lasting for about a week. Fever and leucocytosis were accompanied by marked deterioration in the general condition. As the dermatitis improved the patient suffered from a mild attack of multiple furunculosis. The onset of a Bell's palsy and an attack of sciatica further complicated the already complex clinical picture. Finally the patient's general condition improved somewhat, the skin healed, the urine showed no abnormality, and the sputum diminished in amount and became T.B. negative.

An unusual feature of this series was the infrequency of urinary complications. Apart from the case of hæmaturia, only two patients showed an abnormality in the form of a mild albuminuria. This result is in marked contrast to the experience of many observers. The onset of jaundice after the administration of 0·8 g. of crisalbine was noted. The attack was a mild one and with the administration of glucose and ametox (1·8 g.) all trace of icterus had disappeared within five weeks of the onset.

An alarming complication occurred with solganal. Only two patients received this drug, but in both cases the injection of the final dose (1 g.) was almost immediately followed by nausea, sweating, and syncope. After this experience with the first patient, the administration to the second was preceded by glucose, and the drug was injected very slowly into the vein. But again syncope followed. The patients soon recovered from these transient but alarming symptoms, and indeed appeared to have benefited from the course, as evidenced by their general improvement and a disappearance of bacilli from the sputa.

CONCLUSIONS

It would obviously be unwise, from an experience of only 50 cases, to draw dogmatic conclusions as to the value of gold treatment, more especially because only the immediate results can be considered. But the present series appears to confirm the generally accepted view that gold treatment has at any rate a temporary beneficial effect in selected cases of pulmonary tuberculosis, being especially useful in rendering the sputum T.B. negative and diminishing its amount. There appears to be a simultaneous improvement in the general condition of the patient. Moreover the psychological effect on certain individuals of an additional form of treatment to ordinary sanatorium régime is quite convincing, and is of definite benefit to the patient.

The fact that complications (even though mostly of a mild nature) occurred in 70 per cent. of patients shows the necessity for close supervision of the cases. The infrequency of urinary abnormalities in this series is noted, and the possible value of ametox in treating various complications suggested.

I am indebted to Dr. G. Oliver Hempson, medical superintendent of the Royal National Hospital, for kind permission to publish these cases.

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CONGENITAL UMBILICAL HERNIA

REPORT OF A CASE OF AMNIOTIC HERNIA

By Edgar Freshman, M.B. Manch.,
F.R.C.S. Eng. & Edin.

SURGICAL FIRST ASSISTANT AND REGISTRAR, LONDON HOSPITAL
LATE RESIDENT SURGICAL OFFICER, QUEEN'S HOSPITAL,
BIRMINGHAM

In April, 1930, a primipara, aged 31, was admitted to the Queen's Hospital, Birmingham, and gave birth to a male child. The confinement was normal.

The infant's abdominal wall had failed to develop, and the abdominal contents, protruding as a large hernia, were visible through a transparent covering, which moved over them with the infant's respirations. The deficiency extended from within one inch of the symphysis pubis almost to the xiphisternum; the hernia was about the size of the child's head, and through its transparent wall the liver and the large and small intestine were clearly visible. It appeared to contain the whole of the abdominal viscera, as the abdomen itself seemed quite empty, and the abdominal wall on either side of the opening was flattened and somewhat lax. The skin of the abdominal wall extended for a short distance up the sides of the sac. Unfortunately, the urgency of the condition made it impossible to photograph the infant at the time. The accompanying reproduction of a photograph of a similar case, reported by Dr. Wellington Yates of Detroit,[1] gives a very fair idea of the condition (Fig. 1).

I first saw the infant about two hours after delivery, and as it appeared to be otherwise healthy, arrangements were made for immediate operation. This was begun two hours and fifty-five minutes after the birth of the child, under gas-and-oxygen anæsthesia. The sac, which was composed of fused amnion and peritoneum, was rapidly removed from below upwards, together with a very narrow strip of skin and aponeurosis, in the hope that the layers of the abdominal wall would be distinguished, so that an efficient repair by suturing each separately could be carried out. Peritoneum, aponeurosis, and skin, however, were fused together, and the inner edges of the recti muscles were not seen. As speed and a minimum of handling were essential, and as it was undesirable to sacrifice more tissue than was absolutely necessary, no attempt at dissection was made. It was seen that the whole of the small intestine, the cæcum, the ascending, transverse, and part of the descending colon, the liver, the greater curvature of the stomach, and the spleen were outside the abdomen. As the sac was removed the intestines were controlled and gently compressed backwards into the abdomen by my assistant; to facilitate their retention within the abdominal cavity the edges of the lower half of the deficiency were at once approximated, without much difficulty, by through-and-through silkworm-gut sutures. No difficulty, of course, was experienced in placing the stomach and spleen in the abdomen; the transverse diameter of the liver, however, far exceeded the width of the opening, the margins of which could not be retracted sufficiently to allow of its "reduction," on account of the rigidity of the lower ribs. This difficulty was overcome by partially emptying the liver of its contained blood by gentle uniform pressure with a moist gauze pad, its size thus being sufficiently reduced to allow it to be guided through the opening into the abdomen. This manœuvre did not appear to have any ill-effect on the child. The remainder of the opening was then closed in the same way, and the wound was supported by strapping carried right round the abdomen.

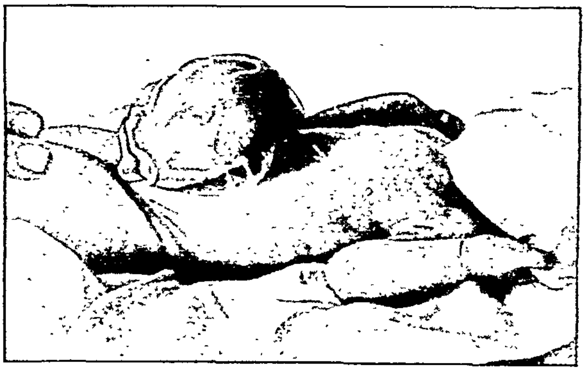

FIG. 1.—An amniotic hernia illustrated in Prof. T. S. Cullen's "Embryology, Anatomy and Diseases of the Umbilicus." Reproduced by permission of the publishers, Messrs. W. B. Saunders Co., Ltd., Philadelphia and London.

The whole operation was completed in 23 minutes. The infant stood it remarkably well. Ten c.cm. of normal saline were injected into each axilla, and breast-feeding was commenced as soon as possible. The wound healed by first intention; alternate sutures were removed on the twelfth day, and the remainder five days later.

The child left hospital at the age of one month, and has progressed well ever since. He is now three and a half years old, and is healthy and normal in every respect, apart from his abdominal wall being formed of dense fibrous tissue over an area measuring 3¼ inches by 2½ inches (Fig. 2). The scar, which is firm and healthy, occupies the space left by the divarication of the recti abdominis muscles; its upper half is a little less firm than the lower, but the maximum protrusion beyond the surrounding level of the abdomen is only about half an inch, and the abdominal contents are controlled in a perfectly satisfactory manner. The recti muscles encircle the hernia on both sides, and are a little less well developed than normal, but their tone is good. There is slight but definite bulging of the scar on straining, but less than there was a year ago. For the first 12 or 18 months the scar gradually increased in width, but since then it has remained the same size; its length has not altered from the first. A belt with a pad was worn for the first year, but this is no longer necessary, and considerable difficulty was experienced in keeping it in position.

In view of the decrease in the relative size of the hernia, and the absence of any disability, no operative interference is contemplated. Moreover, when the child was a few months old, it could be seen that the intestines were adherent to the under surface of the scar, so that any dissection would be fraught with considerable danger, possibly entailing the resection of portions of small intestine. It is also doubtful whether any attempted repair would result in a stronger abdominal wall than he has at present.

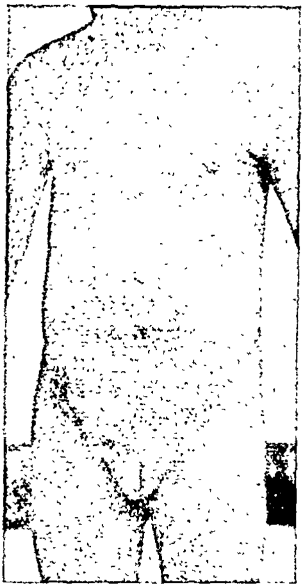

FIG. 2.—Photograph showing the abdominal scar at 3½ years of age.

Two types of umbilical hernia, or exomphalos, may be present in the new-born infant. Cullen [1] describes them under the headings (1) hernia into the umbilical cord, and (2) amniotic hernia.

HERNIA INTO THE UMBILICAL CORD

The terms "hernia into the umbilical cord" or, as it is alternatively called, "true congenital umbilical hernia," are inaccurate, as it is *not* a true hernia, the contents never having been inside the abdomen. By far the greater part of the intestine is developed outside the abdominal cavity, in the umbilical sac, which is part of the extra-embryonic cœlom, and lies in the proximal part of the umbilical cord. At first it forms a single loop—the umbilical or U-loop—to the apex of which is attached the vitello-intestinal duct, the allantois lying on its caudal aspect. Normally the intestine enters the abdomen at the third month, the extra-embryonic cœlom disappears, and the umbilical ring closes. The vitello-intestinal duct has separated from the apex of the loop some time previously, and the intra-abdominal portion of the allantois remains as the urachus.

In certain cases the extra-embryonic cœlom persists, and may retain within its cavity a greater or lesser part of the intestine, resulting in the so-called hernia of the umbilical cord, or true congenital umbilical hernia. This manifests itself as a swelling at the fœtal end of the umbilical cord, whose walls, composed of amnion and peritoneum, are very thin, so that the intestinal loops within the sac are readily visible. The diameter of the widest part of the swelling exceeds that of the umbilical opening, which exhibits a real ring formation. The umbilical vessels are spread out on the side of the "sac," from the deep surface of which adhesions may pass to the coils of intestine contained therein. The remnants of the vitello-intestinal duct may pass from the intestine to the distal end of the "sac," and in some cases a patent urachus is said to be present in its wall.[2]

Many such cases have been reported, notably by Sheen,[3] who described a case in which there was a hernial protrusion into the cord forming a mass the size of a hen's egg, due to the presence of large and small intestine, and by D'Arcy Power,[4] in whose case about a foot of small intestine was present in a fusiform swelling of the cord near the abdomen. According to Milch [5] this condition occurs in 1 in 5000 to 6000 births, and is more common in males than females. Meszáros [6] prefers the term "cœloma funiculi umbilicalis persistens," and is of the opinion that the condition is due to disproportion of the maternal pelvis, with a consequent increase in the curvature of the back of the fœtus, thus preventing the extension of the abdominal cavity in the sagittal direction. As a result of the closure of the muscles of the abdominal wall, the abdominal organs developing in the extra-embryonic cœlom are excluded from the abdominal cavity.

AMNIOTIC HERNIA

In 1881 Nicaise [7] referred to the *amniotic umbilicus*, which is characterised by the absence of skin and muscles around the umbilicus, the defect being replaced by amnion, which is reflected upon the abdomen from the umbilical cord. The surrounding muscles are usually intact. The absence of the abdominal wall at this point results from a failure of cleavage of the epidermal and mesodermal structures in the midline—i.e., non-formation of the fœtal linea alba. The deficiency is represented by amnion and peritoneum, usually fused, and in rare instances it may be very large, with wide separation of the recti muscles. Such a case is reported by Carrington Williams [8] who describes a case of a negro child, seen two days after birth, in which there was a deficiency of the abdominal wall about three inches in diameter. The coils of intestine could be seen through the thin transparent membrane covering them, but there was no protrusion of the abdominal contents.

Intra-abdominal pressure tends to produce a hernial protrusion, especially if the abdominal wall is deficient over a wide area, resulting in the formation of an *amniotic hernia*. Such was the case I have described, and a very similar one was reported by Hipsley,[9] in which the hernia was the size of the fœtal head, and the measurements of the opening four and a half inches by two inches. In his case, the ligaments of the liver were attached to the interior of the sac, and had to be divided when this was removed. Such cases may be regarded as true herniæ, as part—i.e., liver, stomach, and spleen—if not all of their contents must have been developed inside the intra-embryonic cœlom, to be herniated later through the membrane covering the deficiency. That such protrusion can occur is proved by the case mentioned above, in which there was a large deficiency, but no protrusion, and by one described in a personal communication to Cullen [1] by Dr. S. E. Sanderson, who saw a newly born infant in whom the anterior abdominal wall had failed to develop over a wide area; when he saw it, it was three days old, and intra-abdominal pressure had already produced a marked protrusion, which was steadily increasing in size.

Fraser,[2] however, states that an error in closure of the fœtal linea alba accompanies a marked degree of persistence of the extra-embryonic cœlom, with retention within its cavity of coils of intestine. If this is so, large amniotic herniæ, containing viscera other than intestine or considerable lengths of intestine, may well be the result of a combination of these two developmental errors; the contained intestine remaining in the cavity in which it develops, and such organs as the liver, stomach, and spleen, which develop within the abdomen, and perhaps part of the intestine, being pushed forwards by intra-abdominal pressure, thus enlarging the opening that is already present. In such a case this origin could only be established if one were to observe that the rotation of the intestinal loop had been arrested, or were able to recognise the attachment of the vitello-intestinal duct.

TREATMENT

The treatment of all cases of congenital umbilical hernia, and of amniotic hernia, is by immediate operation. It is surprising how well a new-born child stands what is essentially a severe operation. The procedure must be adapted to the condition present; the sac is opened and removed, together with a narrow strip of the margin of the opening in the abdominal wall. If any adhesions or a persistent vitello-intestinal duct prevent the removal of the sac from its contents, they must be divided. The possibility of the presence of a patent urachus must be borne in mind. After reduction of the contents of the sac, aided, if necessary, in the congenital type of hernia by enlargement of the umbilical opening, the abdominal defect is closed. Hipsley, in one of the two cases he reported,[9 10] was able to dissect out and suture the various layers of the abdominal wall; this may not be feasible, and, especially in small herniæ, does not appear to be necessary, through-and-through silkworm-gut sutures being sufficient.

Unless one of the two fatal complications has already occurred, no case should be regarded as hopeless, and operation should be urged. All untreated cases end fatally, and it is uncommon for those with a very large hernia, such as the one described, to survive operation. When operation is deferred for any length of time, the two main dangers are paralytic ileus and infection of the sac wall. In the case reported by Carrington Williams, operation was not undertaken until two days after birth, when the covering membrane had become yellow and opaque, due to the onset of infection. The infant died two days afterwards, and post-mortem examination established the presence of infection; positive cultures were obtained from the peritoneal cavity, the deep surface of the membrane, and the pericardium.

The case may be rendered almost hopeless by injury during delivery, and Hempel-Jorgensen reported two such cases in the same family.[11] An umbilical hernia the size of a cocoa-nut was present in two robust boys born a year apart, of healthy parents. Both infants lived only a short time, for the sacs ruptured during delivery. One of the father's sisters had a child born with a large spina bifida.

I have only been able to find a record of one case in which operation has been undertaken so soon after birth. This was a case of hernia into the umbilical cord described by Reed,[12] in which the cord had ruptured two inches from the umbilicus, so that the bowels had escaped laterally. Conditions were filthy; the child was taken to hospital and operated upon two hours after birth. Recovery was uneventful!

My thanks are due to Mr. E. W. Barnie-Adshead, under whose care the child's mother was admitted, for permission to publish the details of this case.

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SYNCOPAL ATTACKS AS A SYMPTOM OF INTUSSUSCEPTION

BY RICHARD W. B. ELLIS, M.D. CAMB., M.R.C.P. LOND.

IN-PATIENT MEDICAL REGISTRAR AND PATHOLOGIST, HOSPITAL FOR SICK CHILDREN, GREAT ORMOND-STREET

THE occurrence of sudden pallor during the attacks of pain in cases of intussusception is observed so frequently that it is perhaps surprising that the possibility of actual syncope is not mentioned in any of the standard text-books. The recent admission to the London Hospital of a case in which attacks of unconsciousness were the presenting symptom provided a diagnostic problem which was only satisfactorily solved when a closely similar case came under observation one month later. The two cases are reported as examples of one cause of syncope during infancy, since not only is syncope an unusual complication of intussusception but is rare from any cause at this age.

CASE 1.—A. B., a well-developed and nourished male infant of 9 months, weighing 20¼ lb., was admitted to the children's department of the London Hospital on June 22nd, 1933. He had been breast-fed, with added soft solids for the past month, and had had two normal stools on the day of admission. He had been well until three hours before being brought to hospital, when he suddenly screamed, fell forward in his pram, and appeared "lifeless." The attack lasted several minutes, and similar attacks recurred on the way to hospital. When he was first seen in the receiving room the infant was thought to be moribund. He was unconscious, the face and lips ashen grey, and the respiration and pulse were barely perceptible. There was general flaccidity of the limbs, and the eyes were turned upward. By the time he had reached the ward, the infant had regained consciousness and appeared well and active. He was of good colour, the pulse was strong and not unduly rapid, and he played and cried normally. On examination there appeared to be some general tenderness of the abdomen, but no other abnormality was found. There was no vomiting at this time or subsequently. During the next 24 hours the infant had repeated attacks of unconsciousness, which came on without warning and lasted for several minutes. At these times he would suddenly fall forward or collapse on the pillow, and the face become greyish-blue in colour. There were no convulsive movements, and the limbs were always flaccid when examined. Recovery was rapid. The infant would regain consciousness, usually with a cry, and within a few seconds would be of normal colour and show very little evidence of shock. At 1 P.M. on the day following admission (21 hours after the occurrence of the first attack) the infant passed a copious fluid stool containing much dark blood and mucus, and very little fæcal matter. No tumour could be felt on rectal or abdominal examination at this time.

After two further syncopal attacks the infant was entirely free from symptoms and was discharged home on the fifth day. Since then he has been well, and subsequent stools have been normal. Examination of the melæna stool for pus and pathogenic organisms was negative, and the serum-agglutination reactions were negative for the typhoid-dysentery group of organisms.

CASE 2.—C. D., a well-nourished infant of 16 months, was admitted to the children's department of the London Hospital on July 27th, 1933, with one hour's history of vomiting and attacks of unconsciousness of sudden onset. The bowels had been open normally on the day of admission. The syncopal attacks were almost identical in type with those described in the case of the first infant, but were of shorter duration and very much more frequent. The infant was obviously in considerable pain between the attacks. He would crawl around the cot moaning, and would suddenly fall forward, his face becoming greyish-white and the pulse barely palpable. Vomiting was frequent, and not even fluid was retained. On examination the pulse-rate was 144, the temperature 98° F. (rising to 102° F.), and the respiratory rate 50. The abdomen was palpated repeatedly and showed some general rigidity, but no tumour could be felt. At 7 P.M. on the day of admission the infant passed a large amount of blood intimately mixed with fæces. Rectal examination was *negative except for blood on the examining finger.* An anæsthetic was given, when a small tumour could be readily palpated lying under the costal margin; there was no appreciable emptiness of the right iliac fossa. A laparotomy was performed by Mr. A. M. A. Moore, who found the appendix much injected, and a small enterocolic intussusception present. Appendicectomy was performed. The enterocolic intussusception was felt to reduce itself under the surgeon's fingers. Further exploration showed the presence of several large mesenteric glands and four small intussusceptions of the small gut, all of which were readily reduced. Recovery was uneventful. Sections of the appendix showed evidence of subacute appendicitis.

It may be said that the occurrence of fainting attacks in the different age-groups of childhood varies inversely with that of convulsions. Thus whilst convulsions from reflex causes are extremely common during the first two years of life and become progressively less frequent up to the time of puberty, the reverse holds good of syncope. It is singularly rare to encounter true syncopal attacks in infancy, whereas these become relatively common as adolescence is approached. The two cases described above are therefore of some interest as exemplifying the rôle that intense pain may play in the causation of syncope in early infancy. The first case presents two additional peculiarities. Not only was there no vomiting, but the condition appears to have reduced itself spontaneously. It may be said that under these circumstances the diagnosis of intussusception must be regarded as not proven, but the association of intense spasmodic abdominal pain with the passage of a melæna stool hardly admits of any other interpretation, except possibly that of recurrent volvulus. With regard to the likelihood of spontaneous reduction, it should be remembered that it is common during the early stage of an intussusception to find the infant entirely comfortable between the attacks of pain, without any tumour being palpable. Apart from those cases in which the stage of "comfort" really represents a condition of shock, it is probable that in certain other instances the periods of freedom from pain are due to the intussusception actually becoming reduced between the waves of peristalsis, until finally the invaginated gut becomes engorged and œdematous, and consequently irreducible. This is borne out by the extreme ease with which small, early intussusceptions may be found to be reduced at operation, and would account for the absence of vomiting in the early stage, when obstruction would be incomplete and temporary. However, no emphasis can be placed on complete remissions of pain as direct evidence of spontaneous reduction, since they undoubtedly occur in cases in which the gut remains invaginated from the onset. The second case, with a more typical history, showed in addition to multiple intussusceptions, an inflammatory condition of the appendix.

I wish to thank Dr. A. G. Maitland-Jones for permission to report these cases, which were admitted under his care.

BRITISH MEDICAL ASSOCIATION

ANNUAL MEETING IN DUBLIN

SECTION OF OTO-RHINO-LARYNGOLOGY

AT the meeting of this section, presided over by Sir ROBERT WOODS (Dublin) on July 28th, Mr. R. SCOTT STEVENSON (London) opened a discussion on *the treatment of*

Tuberculosis of the Larynx

He referred to the decline in deaths due to respiratory tubercle in England and Wales (from 33,505 in 1921 to 29,658 reported in 1931), whilst the total cases notified at the end of 1931 amounted to 236,758. He pointed out that on Sir StClair Thomson's estimation of infection of the larynx, in an average one out of every three phthisical patients, there would appear the high total of over 78,900 persons in England and Wales afflicted with laryngeal tubercle. In assessing the value of any method of treatment it should be borne in mind that spontaneous cure of the tuberculous larynx was possible; and in comparing groups of cases, the type of case and age of the patient should be considered, since persons of 40 to 55 responded better than those under the age of 40. Artificial pneumothorax, he said, was being more and more used for the treatment of laryngeal tubercle, its only contra-indication being an acute miliary invasion. His own experience of its value had been very striking. Above all, vocal rest and sanatorium régime were most to be relied upon as sheet anchors in treatment. Women responded rather better than men, and in some sanatoria the atmosphere of silence was more readily assented to. than in others. The galvano-cautery was used less and less, but in cases of dysphagia it gave relief if applied exactly to the local lesion. Mr. Scott Stevenson had much hesitation in advocating diathermy. With regard to the value of artificial sunlight, he referred to the conflict of opinion between such authorities as Strandberg, of Copenhagen, who was much in favour of its use in his out-patient clinic, and Sir StClair Thomson, who found it of no value for sanatorium patients. The two types of patient were, however, not comparable, and as the result of experience in L.C.C. sanatoria he shared Dr. Heaf's opinion midway between the two extremes. Of other forms of treatment, local sun-baths, as used by Wessely and Miller in America, proved a long and tedious method. There was considerable promise from the use of the Kromayer lamp with laryngeal applicator designed by Dr. W. Beaumont, and applied in some cases at Colindale Sanatorium. Mr. Scott Stevenson referred also to treatment by chaulmoogra oil, and to the good effects recorded by W. C. Fowler by the injection of gold salts. Tracheotomy was seldom called for except for the relief of stridor and dyspnœa. For dysphagia, insufflation with orthoform and anæsthesin by Leduc's tube was advocated. In 50 per cent. of a large number of cases at Colindale the blocking of the superior laryngeal nerve with alcohol had proved effective. The patient should be treated rather than the larynx, due regard being given to the lung condition, whilst a routine laryngeal examination of all suspected cases of phthisis might afford evidence of infection not revealed by the stethoscope. Whilst it was difficult to assess the various methods of treatment at their true value, in the 230 laryngeal cases under Mr. Scott Stevenson's observation during 1932 the mainstays had been sanatorium régime and vocal rest, supplemented by artificial pneumothorax.

Mr. P. J. **Keogh** (Dublin) commented on the risk of laryngitis following sinus or antrum infection in cases of phthisis, allowing access to the tubercle bacillus through the damaged surface epithelium. He emphasised the need for vocal rest and the importance of arranging for an expert laryngologist to be available at every sanatorium, with full coöperation between him and the physician. This was especially necessary in connexion with treatment by artificial pneumothorax, which helped to cure both lung and larynx, whereas attention confined to the latter would not cure lesions in the former. Use of the galvano-cautery limited to the surface of an ulcer was of service, but over-treatment was harmful. He had also found that when directly applied chaulmoogra oil gave relief to pain, but he did not favour either the use of lactic acid or injection of alcohol and crushing of the superior laryngeal nerve as carried out in America. The application of artificial sunlight was not a simple procedure and required more observations before its real value could be assessed.

Mr. H. S. **Barwell** (London), speaking of the choice of climate, said that the high altitude of Swiss resorts made them unsuitable for laryngeal cases, which in the early stage might give rise to no symptoms; hence the importance of examining the larynx in every case of phthisis. Treatment should include abstinence from tobacco, and the use of a watery alkaline spray or chloretone, combined with sanatorium régime and absolute silence; the latter need only be insisted on in curable cases. The forced whisper was more harmful than low speech. Local treatment—e.g., lactic acid and formol applications, or the galvano-cautery—should only be considered in patients who had been in a sanatorium for some time under silence. The curettage of tuberculous ulcers of the larynx was advocated for the stimulating effect of tissue reaction and its resulting fibrosis. Removal of the epiglottis had proved successful in relieving discomfort. In the presence of severe dysphagia little relief could be given except by removal of the free edge and part of the swelling, while in milder cases the pain might be relieved by insufflation with orthoform and anæsthesin, or Euphagin. In extensive ulceration alcohol injection into the superior laryngeal nerve was occasionally beneficial. Tracheotomy generally proved harmful, but in exhausting dyspnœa it might give relief. It was well to remember that pulmonary tubercle never improved whilst the larynx was seriously involved.

Dr. F. R. G. **Heaf** (London), discussing prognosis of tuberculous laryngitis, pointed out the great changes which treatment had effected since the days, 40 years ago, when cure was regarded by leading experts as hopeless. Despite the serious prognosis still given by many clinicians, the patient's usual optimism was a great aid to recovery, provided he followed advice, especially as to vocal rest. The statistics of the common association of laryngeal with advanced pulmonary tuberculosis had given rise to a pessimistic outlook in many cases. But he regarded post-mortem evidence as unreliable, and it did not follow that tuberculous laryngitis determined a fatal issue. He had had patients with combined infection, who had recovered completely from the laryngitis, yet later succumbed to the chronic pulmonary lesion. The prognosis depended on many factors such as the patient's resistance, temperament, symptoms, and habits, as well as on local conditions. With regard to resistance, family and previous history, the rapidity of onset, and the type of lung lesion often gave valuable information, together with that derived from serial blood examinations—thus, a rapid sedimentation-rate, high monocyte count with low lymphocyte and eosinophil counts indicated a poor resistance, and, if these continued, the laryngeal lesion would not improve. The more fibrotic the type of lung lesion, the less active was the laryngeal infection—allowing of a favourable outlook in patients of 40 up to 60 years old, after which age the course was rapidly downhill. Dr. Heaf discussed in detail the types of laryngeal lesion affecting prognosis, classifying them under the four heads: *extrinsic*—very bad, especially up to 35; *intrinsic*—fairly good, and if no dysphagia, reasonably hopeful; *localised*—the majority did very well; *lupoid*—rarely caused symptoms and responded favourably. Among general aspects he laid stress on the importance of temperament as governing prognosis, and the effect of self discipline and control in allowing vocal rest and following out treatment. Strength of will and moral fortitude backed by every encouragement to secure recovery were essential. In regard to the use of tobacco, he said, there seemed no evidence that moderate pipe or cigarette smoking, *without inhaling*, had any effect on the prognosis of tuberculous laryngitis. Concurrent diseases would influence prognosis according to their general effect on the body—improvement was undoubtedly brought about by treatment of defective conditions of the nasal and nasopharyngeal passage. In conclusion Dr. Heaf again emphasised the need for attention to the general condition, particularly as shown by the patient's blood picture.

Dr. J. R. **Wheeler** (Belfast) said that 14 per cent. of the patients in a tuberculosis hospital had laryngeal infection, and in 99 per cent. of those so affected tubercle bacilli were found in the sputum. The condition occurred chiefly in more advanced pulmonary cases, only 7 per cent. of those with less active phthisis having a laryngeal infection. Prognosis in laryngeal cases was dependent on the response of the lung condition to treatment, either by artificial pneumothorax or thoracoplasty. The laryngitis was aggravated by lesions of the upper respiratory tract, but tended to clear up after the latter had been treated.

Dr. P. J. **Dempsey** (Dublin) said of vocal rest that the forced whisper was harmful, but that the use of the voice for a few minutes at meal times might wisely be allowed for temperamental reasons. The use of lactic acid should be entirely given up owing to the difficulty of its exact application, and trichloracetic acid was preferable for local treatment. Tracheotomy should be reserved only for cases of dyspnœa owing to the risk of septic infection. In phthisical patients or presumed cures, the question of tonsillectomy should only be approached with great caution, as it appeared to have a harmful effect on the lung condition.

Mr. A. D. SHARP (Leeds) referred to the frequent association of tuberculous laryngitis with defects of the nasal passages, such as deflected septum, large turbinates, and poor air entry. Experts differed in their estimation of the effect of artificial sunlight. The galvano-cautery, and, in severe ulceration of the larynx, the local use of lactic acid, had proved efficacious when given under a general anæsthetic, the effect of which need not be harmful.

Mr. J. B. HORGAN (Cork) said that many cases of phthisis with cavity had shown at autopsy either macroscopic or microscopic lesions of the nasopharynx. Early diagnosis of laryngitis was of supreme importance, as the chances of recovery depended on treatment of the early stage; hence the need for training of students and practitioners in the use of the laryngoscope.

The PRESIDENT said that tuberculous laryngitis was essentially a chronic infection which did not encourage sufficient tissue reaction, resulting in a sort of compromise between invader and the subject of attack. Resentment in the tissues should be excited to allow the chronic infection to become an acute process; such stimulus was afforded by the use of the electric cautery, and other agents were available according to the particular case. The principle of the need for tissue reaction should always be kept in view if treatment was to be successful, quite apart from sanatorium régime and vocal rest. He advocated ordinary X ray treatment for the general condition of laryngitis with subchordal thickening over a large area by a series of exposures five minutes at a time weekly or bi-weekly.

Dr. R. R. TRAIL (Midhurst) quoted a case of recovery following artificial pneumothorax in a patient who had been given up after four months rest in bed. At Midhurst, he said, general light treatment had given good results in a type of case which had not responded to pneumothorax. It was important to avoid following only one line of treatment, for it was the individual patient who needed attention.

Mr. BARWELL stated that the onset of tuberculous laryngitis, while the patient was under sanatorium treatment and after the induction of pneumothorax, afforded a bad prognosis. As a rule the earliest lesion usually occurred near the vocal process. Lactic acid he had found useful in ulceration of the cords. Tracheotomy was advisable only in the presence of marked dyspnœa, and tonsillectomy only if the laryngeal lesion was making no progress.

Mr. R. R. WOODS (Dublin) said that the most that could be done was to help the patient to improve his lung condition, for if this were progressive little could be done to improve the state of the larynx—hence the value of artificial pneumothorax. The prognosis of the laryngeal was exactly that of the pulmonary condition.

Mr. SCOTT STEVENSON, replying, said that the fundamental points were treatment of the patient rather than the larynx, no special measures being relied upon, but such local remedies as best suited particular cases. He had found lactic acid of value for large ulcers of the larynx. Septic tonsils had been removed with good results in most cases, but not under a general anæsthetic, which was liable to be followed by acute miliary dissemination. Attention to nasal cleansing and use of an alkaline nasal douche helped to improve the laryngeal condition. Preventive measures were the most important, especially the laryngeal examination of all pulmonary cases.

Dr. HEAF, in his reply to the points raised on prognosis, emphasised the need for consideration of all the factors in treatment as well as the patier
occupation, age, and blood picture.

Dr. C. D. S. AGASSIZ (London) then read a paper

TUBERCULOSIS OF THE LARYNX IN CHILDREN

a condition which he described as usually with
symptoms. He had not found laryngoscopy m
difficult in children than in adults. In a group
86 girls suffering from pulmonary tubercle,
sputum of 55 had shown tubercle bacilli and
had laryngeal tubercle, in all but one of whom tube
bacilli were found in the sputum. In the en
series of pulmonary cases showing tubercle bac
the larynx had been affected in 20 to 25 per cent.,
a primary laryngeal lesion was very rare. In
children of 7 to 16 years examined, tubercul
laryngitis was more often found between 11 and
and in girls rather than boys. While laryng
infection was usually more common in cases wh
the lung lesion was extensive, it might occur w
no evidence of marked lung disease and in the abse
of tubercle bacilli in the sputum. In seven ca
no symptoms had been noticed by parents, but
voice was toneless with slight huskiness and exami
tion showed reddening of the cords and aryten
deposits. Dysphagia was very rare and never
severe as in adults; at most slight transitory p
on swallowing was complained of. Routine laryn
scopic examination of all children suffering fr
pulmonary tubercle was well worth while.
prognosis was usually good in children, the laryng
lesion being only slowly progressive, as in a c
quoted where the lesion had shown little adva
after four years.

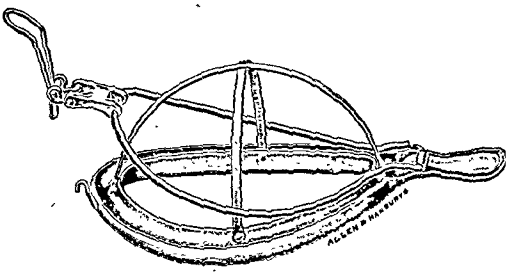
FILM DEMONSTRATION

The session concluded with a film demonstrat
of the treatment of tuberculosis of the larynx
means of the Kromayer lamp, Model II. with laryng
applicator as designed by Dr. William Beaum
and carried out with sunlight treatment at
Camden Town clinic. A case of lupus, involv
pharynx, fauces, and larynx, had received di
irradiation of the larynx by ultra-violet rays for th
minutes, three times a week, the larynx being trea
before the fauces without the necessity of a lo
anæsthetic.

NEW INVENTIONS

A NEW INHALER CLIP

I HAVE devised a fastener on the "lever-
principle" for use with all masks of the Schimmelbu
type. This clip can be snapped on in a moment



cannot possibly release itself however many layers
gauze are used. I, personally, am in the ha
of using ten layers of 4-fold gauze. The clip has b
made for me by Messrs. Allen and Hanburys L
of Wigmore-street, London.

H. E. KARSLAKE ECCLES, M.R.C.S., L.R.C.P

REVIEWS AND NOTICES OF BOOKS

The Surgery of the Stomach and Duodenum

By SHELTON HORSLEY, M.D., F.A.C.S., LL.D., Surgeon to St. Elizabeth's Hospital, Richmond, Va. London: Henry Kimpton. 1933. Pp. 260. *5s.*

Dr. Shelton Horsley's name has long been associated with gastric surgery, and his views as set forth in this book are thus of great interest. They are stated simply as expressions of opinion derived from clinical observations and illustrated by case records, without any attempt at statistical presentation. This is no matter for regret, since statistical tables when not compiled by an expert are frequently misleading under their guise of mathematical accuracy. Dr. Horsley devotes much attention to careful pre- and post-operative treatment. We agree with his plea for free administration of opiates during the first 48 hours after a serious gastric operation; and though routine lavage for all cases of the stomach would seem unnecessarily distressing, this is perhaps better than neglect of the stomach-tube in cases where it is actually necessary. The continuous saline intravenous drop is apparently used fairly often in the author's practice, and the original procedure is adopted of administering it before spinal anæsthesia, leaving the cannula in place so that adrenaline may be given by this route in case of emergency. Gastropexy still seems to be used in his clinic, though its indications are not clearly stated. The Janeway gastrostomy here recommended is very satisfactory, but in our view it is too complicated to be advisable considering how few months the ordinary patient with carcinoma of the œsophagus has to live.

Dr. Horsley now restricts the use of the pyloroplastic operation which bears his name practically to cases of anterior duodenal ulcer where the lesion can be excised. He advocates on theoretical grounds a modification of the Billroth I. operation, in which the duodenum is attached to the lesser curve extremity of the gastric lumen. This means that more of the lesser curvature must be left whilst the difficulties of apposition are increased. He has not established by X ray examinations or otherwise his contention that following this modification the motor power of the stomach is better than after the original Billroth I. procedure, whilst there is ample evidence of the excellent functional results of the latter. Many surgeons will feel that he does not give sufficient prominence to the anterior type of Polya operation. However, in a monograph dealing with personal experiences no exception can be taken to the selection of those methods which the author himself prefers. Surgeons interested in gastric and duodenal disorders will find many useful hints in this work.

Chronic Arthritis and Fibrositis

Diagnosis and Treatment. By BERNARD LANGDON WYATT, M.D., F.A.C.P., Director, The Wyatt Clinic; Member Editorial Staff of "Acta Rheumatologica" of the International League for the Control of Rheumatism. London: Baillière, Tindall and Cox. 1933. Pp. 202. *20s.*

Dr. Wyatt does not approach his subject from any new angle, nor does he throw any fresh light on the many unanswered problems that these diseases present. His book is, as he says, purely technical in character and will therefore be of special help to the medical practitioner on whom lies so often the responsibility of early diagnosis. Half the book, apart from the general and historical survey, is devoted to special therapeutic measures, a welcome change from books on most other medical conditions in which treatment is generally disposed of in a few brief pages. The difficulty with the arthritides is not that we have no suitable forms of treatment, but rather that we have too many, and a suitable choice of measures needs experience and great care if good rather than harm is to result. On the subject of diet Dr. Wyatt is refreshingly broad-minded. He says: "It would be difficult indeed to find a subject about which there are more fads and fancies than are associated with foods and their rôle in the prevention and treatment of chronic arthritis . . . . there is no more justification for many of the ingrained beliefs than there is foundation for the theory that a diet of turnips will make one brave or that the application of raw beefsteak will cure a black eye." Nevertheless diet and food requirements are treated in this book in detail and the sample meals and table of food values will be very helpful. In the chapter headed Discussion and Summary an interesting table is given of the primary and secondary causes of the chronic arthritides and their relationship, prefaced by one of the best short summaries of our present knowledge of these diseases hitherto published. Dr. Wyatt stresses the importance of composite programmes of therapy to suit individual requirements although, as he says, certain therapeutic factors are of benefit to almost every patient. In adverse criticism of this book one might say that too much space is devoted to the introduction which covers a general and historical survey of the disease, not because it is uninteresting but because readers may be put off, whereas if they turn first to the later sections they will find definite help.

Die Histopathologie der Uterusmucosa

By Dr. H. T. DEELMAN, Ord. Prof. der allgemeinen Pathologie und pathologischen Anatomie der Reichsuniversität Groningen. Leipzig: Georg Thieme. 1933. Pp. 247. M.24.

THE interpretation of the appearances of scrapings from the uterus requires an intimate knowledge of gynæcological pathology; many clinical pathologists have trouble in dealing with material of this kind. Dr. Deelman's monograph is written rather for the general pathologist than for those who specialise in gynæcology. The first section deals with the decidua of pregnancy and its abnormalities and the difficulties in interpreting curettings from abortion cases are clarified. The distinction between the necrosis around the plasmoditrophoblast and the necrosis of septic abortion is emphasised and the invasion of decidua by isolated cells of the Langhans layer during normal pregnancy is recognised. A valuable description of the involuting vessels of the endometrium is included, but more could have been written of the decidual glands and the account of the degenerate villæ so frequently seen in curettings is in many ways incomplete. The section on hydatidiform mole and chorion epithelioma is very good though perhaps more technical than the general standard of the monograph. Endometritis does not receive sufficient attention although the views expressed are both modern and accurate. The most interesting chapter is that headed "Atypie" in which various abnormalities of the endometrium are grouped together. The author brings into prominence various atypical appearances which have puzzled gynæcologists and may represent early forms of carcinoma. Some of these abnormalities have just been described in the *Journal of Obstetrics and Gynæcology of the British Empire* by John Beattie. Carcinoma of the body is well described, but hypertrophy and hyperplasia of the endometrium are not dealt with very clearly. Such conditions perhaps interest gynæcologists more than pathologists. No description is given of the normal cyclical alterations of the endometrium and the general pathologist may find some of the descriptions difficult to understand unless he remembers these. There is no bibliography, and references in the text are restricted to the well-known German handbooks; but the series of 248 photomicrographs are so good as by themselves to repay a study of the work.

Diet in Sinus Infections and Colds

By EGON V. ULLMANN, M.D., formerly Special Lecturer for Biology at the Oregon State College, and Instructor at the First Medical Clinic at the University of Vienna. London: Macmillan and Co., Ltd. 1933. *Pp.* 166. 10*s.*

DR. ULLMANN'S thesis is that in people who are inclined to colds and diseases of their sinuses we have to deal with a tendency towards "acidosis." But by this expression he does not mean a condition which has for long been labelled acidosis by the medical profession. He is not concerned with disturbances of the basic-acid equilibrium of the blood, but with people who show a fast metabolism, burning up their reserves; these persons are of a nervous type, restless, and easily worried. The principles of his regimen are the use of only fresh food, the restriction of salt, preference of alkaline food, reduction of "animalic" proteins, reduction of carbohydrates, and the use of unrefined carbohydrates; meat is limited to 16 oz. a week, with 6 oz. of sweet-bread, brain, kidneys, spleen, liver, or fresh fish; much importance is given to the value of fruit and vegetable juices, and alcohol is forbidden. Although it contains a chapter on testing the urine for acidity and chlorides, the book is evidently written for the general American public rather than for medical men. There is doubtless some merit in this type of diet, and the use of white bread and of tinned or preserved foods, to the exclusion of a fresh and simpler diet, is a retrograde step; but Dr. Ullmann has hardly proved that his faith in the diet he recommends is based on scientific principles. An appendix contains a number of receipts by Elza Mez.

The Sterile Period in Family Life

By the Very Rev. Canon VALERE J. COUCKE, Professor of Moral Theology, Grand Seminary of Bruges; and JAMES J. WALSHE, M.D., Ph.D. New York: Joseph F. Wagner. 1933. *Pp.* 70. 2*s.* 6*d.*

THE first of the five chapters of this small manual contains a discussion of the moral aspect of the control of conception. Here the confessor is urged to impress upon the penitent that the malice of onanism resides not in a desire to avoid procreation (an aim which on occasions may be laudable), but in "the perversion of the order of nature and in the use of a means that is contrary to natural purposes of the function of generation." It is further contended that "God has disposed and ordained that at certain definite times the intercourse will be naturally unfruitful or rarely fruitful." In the remaining chapters, which seem to have been written by Dr. Walshe, the views of Dr. Knaus, of Gratz, and Dr. Ogino, of Japan, are expounded. The conclusion is reached that "the week before menstruation is the sterile period, and there may be a further extension of the exempt period for three days at least after menstruation." The infertility of the post-menstrual three days is, however, less to be relied upon than is that of the premenstrual week.

This is by no means the first theological pronouncement upon the "safe period," which, in the past, has been thought to occur at all stages of the intermenstrual interval, the earlier views having been based upon the erroneous assumption that the time of ovulation synchronised with that of menstruation. The writings of the Austrian and Japanese authorities mentioned above have now resulted in the application of the imposing title of "the Knaus-Ogino method" to the utilisation of the safe period for contraceptive purposes.

This latest pronouncement is in accordance with recent physiological and statistical research, but the latter suggests that the sterility of the premenstrual week cannot be entirely relied upon, and that, in fact, there is no period of the month at which conception has not occurred in some women.

Pneumolyse intrapleurale

By LOUIS SAYÉ, Professor in the Faculty of Medicine, Barcelona. Paris: Masson et Cie. 1933. *Pp.* 242. Fr.40.

IT has been said that a good artificial pneumothorax is better than a thoracoplasty, but that a thoracoplasty is better than a bad pneumothorax. Prof. Sayé emphasises the great differences in the results obtained from a complete and partial pneumothorax in the treatment of pulmonary tuberculosis. Under modern procedure it is often possible to convert a partial pneumothorax into a complete one by dividing adhesions which prevent the lung from collapsing. The indications for cutting adhesions are here discussed, and the methods of Jacobaeus and Maurer are described in detail. Lung tissue is sometimes found in an adhesion even at its attachment to the parietal pleura, so that section of the adhesion necessitates cutting the lung—an accident which usually leads to pyopneumothorax and a fatal issue. In order to avoid this G. Maurer, using diathermy, cuts a circle in the parietal pleura round the attachment of the adhesions which can thus be detached without injury to lung tissue. Prof. Sayé gives details of 37 pneumothorax cases in which he has divided adhesions by Maurer's technique with remarkably good results, 22 being cured. The value of sanocrysin, used in conjunction with pneumothorax, is discussed. The author's experience leads him to believe that though improvement occasionally follows small doses, it is usually necessary to give a total dose of 8–14 g. in order to obtain definite results. The book is one of a series entitled Bibliothèque de Phtisiologie, published under the direction of Prof. Léon Bernard, and can be recommended to those interested in the subject. It is well illustrated with 119 radiograms and drawings, and concludes with a useful list of references. The index might be improved.

THE HARLEY-STREET CALENDAR.—Dr. H. H. Bashford's attractive account of the lives of some of the most celebrated British doctors, reviewed in THE LANCET when it first appeared (1929, ii., 932), has been reissued by Messrs. Constable and Co. at the price of 3*s.* 6*d.*, which should bring it within the reach of a very wide circle of readers.

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RHEUMATOID AND OSTEO-ARTHRITIS

For description of cases see Editorial Article, "Ambulatory Treatment of Fractures and Diseased Joints by the Hoefftcke Splint," *The Medical Press and Circular*, April 27th, 1932, pages 348–351.

The Ambulatory Treatment and Manipulation with Extension for Diseased Joints, by Carel A. Hoefftcke, 7, Harley Street, London, W.1, and Bellevue Spa, Trefriw, North Wales.—See *The Medical Press and Circular*, August 2nd, 1933, pages 107–112.

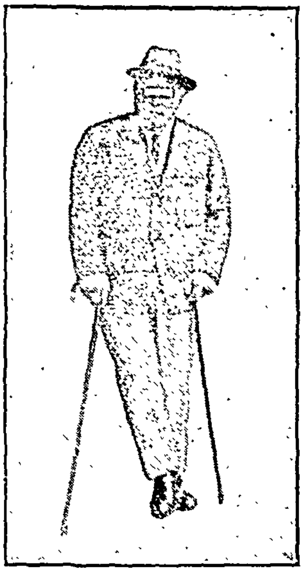

FIG. 1. July, 1929.
Mr. S. Hip-joint adducted.

Mr. S., aged 67 years, was sent to me by Dr. M. with a very painful osteo-arthritic hip. The limb was adducted, with an apparent shortening of about 2½ inches. The hip was manipulated on my special extension table, July, 1929, and free movement with good abduction was obtained. Three months after my extension splint was first applied, in August, 1929, Mr. S. was enabled to go fishing and shooting without pain in the joint. Two years after the extension splint was applied it was removed, with free and painless movement as the result. Doctors in attendance and patient well satisfied with the movement and improvement in shape of the joint surface as shown in *Figs.* 1, 2, 3, 4.

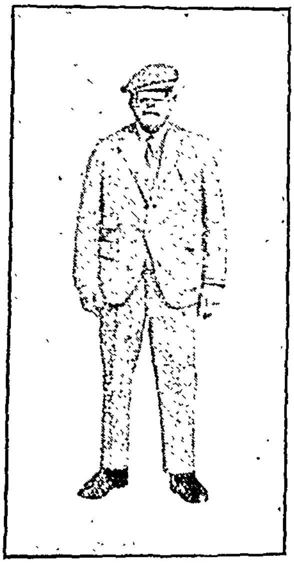

FIG. 2. February, 1931.
Mr. S. Hip-joint abducted.

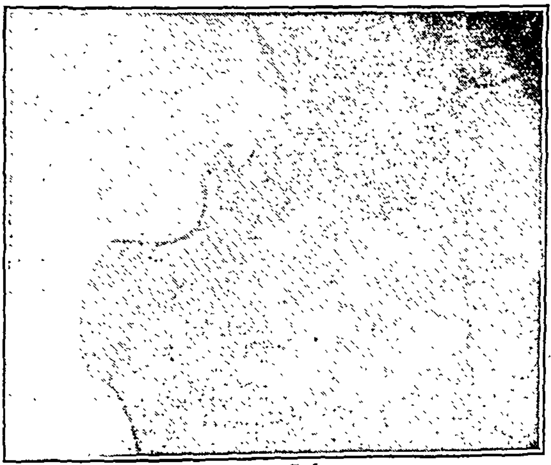

FIG. 3. July, 1929.
Shows the hip-joint practically ankylosed in the adducted position with osteophyte showing on upper rim of femur head. Patient hardly able to walk and in great pain.

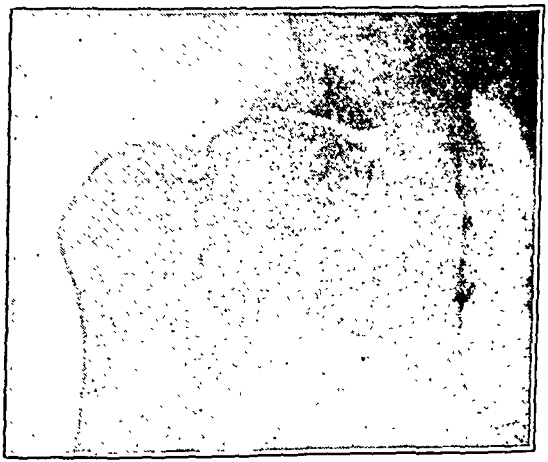

FIG 4. February, 1931.
Shows spike absorbed; cavity filled in: head of femur covered with new cartilage resulting in free abduction with full painless movement in the joint.

Particulars and illustrations of this treatment will be forwarded on application, and original radiograms of these and other cases can be shown by—

CAREL A. HOEFFTCKE, 7, HARLEY STREET, LONDON, W.1
and BELLEVUE SPA, TREFRIW, NORTH WALES.
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THE LANCET

LONDON: SATURDAY, SEPTEMBER 23, 1933

AIR EMBOLUS

Air embolism occurs as an acutely embarrassing, occasionally even a tragic, sequence of pleural puncture. Happily it is a rare event, but its rarity should not induce a false sense of security in those whose work necessitates constant puncture of the chest. It is a risk which must be taken into consideration whenever treatment by artificial pneumothorax is proposed and must not be ignored when pleural aspiration or lavage is performed. Precautions to prevent its occurrence should never be forgotten and stimulants such as adrenaline, atropine, and caffeine should always be at hand. Three cases of air embolus are reported by Dr. M. Pollak in the August number of the *American Review of Tuberculosis.* The first occurred when an attempt was made to determine the pressure in the pleural cavity of a student aged 16 years in whom pneumothorax had been abandoned apparently as the result of an obliterative pleurisy. No air was introduced, and when the needle was withdrawn there was no evidence that bleeding had occurred; yet a syncopal attack with stertorous breathing and the exudation of blood-stained froth from the mouth followed the puncture, and Jacksonian epilepsy proved that cerebral embolism had supervened. In the second case during the irrigation of a pleural cavity which contained pus, symptoms of air embolism involving the bulbar area were noted. In both these cases recovery was uneventful. The third case, which was associated with the spontaneous rupture of a lung during an operation for phrenic evulsion, had a fatal termination; post-mortem examination revealed that the coronary arteries contained air bubbles, and that the heart, which was dilated, was full of foamy blood.

When a pulmonary vein is accidentally opened it is easy to understand the occurrence of air embolism, and the first example illustrates the classical condition and the usual course of events. In the second case, though the needle might possibly have injured a pulmonary vein, for pulmonary collapse is seldom complete and puncture is made in the dark, Dr. Pollak considered that an injury to a pleural vein was the probable cause of the symptoms. If this is so one must assume that an air bubble had passed through the pulmonary capillaries before finding lodgment in the medulla, which, in view of the extremely minute channels through which it would have to pass, seems very unlikely. In the third case there had been no apparent injury to the cervical veins, and it seemed that the spontaneous pneumothorax, which occurred apparently at the time the phrenic was exposed, may have been responsible for the accident. The cause of the pulmonary rupture is not stated. In this country one or two cases of spontaneous pneumothorax following phrenic evulsion have been described, but here it seems that the nerve was neither sectioned nor evulsed. It must be confessed that the mechanism of air embolism is not always easy to understand, and further, that from the clinical standpoint it is sometimes difficult to differentiate between this condition and that known as pleural eclampsia, the greatest manifestation of pleural shock. This difficulty was emphasised in recent correspondence in our columns following the publication of a case of air embolism by Dr. V. R. Walker.[1]

What steps can be taken to prevent the emergency from arising? The most obvious precaution is never to puncture the pleura without sufficient reason for doing so. The second is to see that the patient's head is at a low level when inducing a pneumothorax or giving a refill, for as Dr. Pollak points out, both experimental and clinical experience indicate that the danger of embolus is greatest when the subject of operation is in an erect or semi-erect position. A third and most important precaution in all pneumothorax work is to watch the manometer when the needle penetrates the pleura, and to keep the stopcock of the air-container closed until a sufficient manometric fluctuation shows that the needle is in a free pleural cavity. Dr. B. W. Cobbs, in the same issue of the American review, has described a simple protective technique by means of which, he claims, the risks of air embolism in pneumothorax work may be reduced to a minimum. At the commencement of an induction the bottles are adjusted so that the level of the water in the air-bottle is about 10 cm. higher than that in the pressure-bottle, the flow of air being thus away from the chest, so that at the moment of puncture there is a negative pressure in the pneumothorax needle. When the eye of the needle is closed by the tissues of the chest wall the flow of the water is checked, leaving a standing negative pressure of 4 or 5 cm. recorded on the manometer. The bottle system can then be temporarily closed and the needle thrust on till it enters the pleural cavity, when the manometer will at once come into action. When the bottle system is again opened, if the needle is in a free pleural cavity, air will be sucked into it, but if it should by any chance have punctured the lung and cut the wall of a pulmonary vein no harm will ensue, for in this case there will still be a negative pressure in the needle sufficient to prevent the entry of air into the blood stream. It should be realised, however, that even when precautions are taken air embolism and pleural shock may still occur, that no system of pleural puncture can be fool-proof, and that "to stick a needle in the chest" calls for as much care in technique and gentleness in action as any other minor operation.

THE POTENTIAL SUICIDE

Some months ago a young woman student in a fit of depression ate six sticks of solidified methylated spirit and we expressed at the time[2] a fear that the publicity given to the coroner's quest might lead to other similar cases. That fear has unfortunately been realised. At a recent inquest it was shown that a similar substance had been the cause of death of a woman, aged 61, a voluntary patient in a mental hospital. Some 16 days before her death she had been in the town on parole and had returned with it unknown to the hospital authorities. The coroner commented on the warning on cartons containing the material to the effect that it should not get into the hands of children, and the medical superintendent is reported as saying that the substance is quite as poisonous as any substance scheduled as poison. The coroner promised to write to the Home Office in this sense.

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[1] The Lancet, 1933, i., 636, 720, 775.

[2] Ibid., July 22nd, p. 194.

The suicide who chooses poison as a method of release searches for a substance easy of acquisition, easy of administration, and thinks in terms of the quantity required. Provided the quantity be great enough, almost any chemical in household use may produce the desired effect. Indeed, few household materials have not been turned to his uses, e.g., wireless batteries, whilst many gardens contain substances which, did he but know it, might provide him with what he wanted. How far can social restrictions go to rid the world in which the suicidal patient moves of instruments for self-destruction ? And how far does the publicity given to a new and easily accessible poison increase the total number of suicidal attempts ? These questions are easier to ask than to answer. It has not been proved, and scarcely could be, that the marketing of a new substance suddenly caused a rise in the rate of attempted suicide. The vision of a world where substances that might be used with suicidal attempt were scheduled or removed is not a cheerful one, for coal-gas would be the first commodity to go. As a result of two cases of yew-leaf poisoning last year, some mental hospitals have lost trees that added to the artistic amenities of a life that was too often unrelieved by beauty of its restrictions. The medical officer makes his hospital a world fit for suicides to live in and when he far-sightedly permits parole may be faced with tragedy. The magistrate, on the other hand, wants no risks to be run. To him " once a lunatic " is " always a lunatic." The attempted suicide of a girl, lately discharged from the Croydon Mental Hospital, led to observations by the bench last week in the Mansion House Justice Room which will shock many of our readers. " I suppose the hospital wanted to get rid of her," Alderman Neal is reported to have said ; " I consider it nothing short of a public scandal."

Most psychiatrists believe that a suicide will achieve his end whatever restrictions are imposed, short of constant watching by nurses. In some cases the amount of supervision required and the furtiveness of the patient are unbelievable. If tragedies are to be completely avoided no patient must ever be let out on parole, or if he is, on his return he must be searched with that revolting thoroughness which constitutes part of the daily treatment of the morphinist. Any such methods would be intolerable in mental hospital practice. The alternatives of " no parole " or frequent searches are equally degrading for the recovering patient. But whilst it is so hard to circumvent the secrecy of some intending suicides, it would seem less difficult to spread the knowledge that the suicidal intent is a commoner feature of our social life than we commonly admit, and that that intent may come upon a man with the suddenness of a tempest or be secretly planned with subtlety. It is an intent which, in the milder degree as a phantasy, has, if we were honest, crossed most of our minds, and this may explain something of our fears, precautions, and reactions when the subject is even whispered. Indeed, the mental hospital patient is not so very far from any one of us, though we seldom like to remember this except when we are reminded of a common catchword about genius. If we could but bring this conception to bear upon our thoughts of the insane we should mould a public opinion that would see less difference between a mental hospital and a hospital for rheumatic diseases. Persons might then come to consult a doctor about suicidal feelings with as much aplomb as some women consult their friends and many doctors about pains in the back.

TUBERCULOSIS OF THE LARYNX

It is established that the larynx is very rarely a primary focus of attack by the tubercle bacillus. Its invasion is a complication, and one of the most dreaded complications, of pulmonary tuberculosis. The sheet anchors of treatment are sanatorium régime and vocal rest, with judicious use of the galvano-cautery or other local stimulating measures, where intractable lesions remain after an ample trial of general methods. No striking advances in the methods of treatment in tuberculosis of the larynx have been made in recent years, but the outlook has gradually become far more favourable. This was clearly shown during the discussion, reported on another page, which took place before the section of oto-rhino-laryngology of the British Medical Association in Dublin. One reason for improved statistics is that artificial pneumothorax is being employed more frequently in the treatment of pulmonary phthisis and has in suitable cases an excellent influence on the laryngeal disease. Sir Robert Woods, the president of the section, noted that the tuberculous lesion is a chronic process which does not encourage sufficient tissue reaction ; the cautery provides a stimulus to excite such reaction, and in his experience X ray treatment by a series of five-minute exposures once or twice a week is also useful for this purpose. The Kromayer lamp, as modified by Dr. William Beaumont for application to the larynx, probably acts in a similar way. Artificial sunlight, on the other hand, is held to exert its action through the general system. Its use is strongly advocated by Strandberg, who employs it on out-patients. Sir StClair Thomson has not found it of any value among patients in sanatoria ; but Mr. R. Scott Stevenson traces some benefit to its application to such cases, and according to Dr. R. R. Trail it has given good results at Midhurst in a type of case which did not respond to pneumothorax. In the course of the discussion Mr. P. J. Keogh and Mr. A. D. Sharp called attention to the increased risk of invasion of the larynx which resulted from the presence of infection in the antrum and the other nasal sinuses in phthisical patients, and from nasal obstruction. Mr. H. S. Barwell pointed out that the high altitude of Swiss resorts rendered them unsuitable for laryngeal cases. His reminder that silence is a severe and depressing measure, on which it is cruel to insist unless there is a prospect of cure, is timely. In this connexion it is often forgotten that the forced whisper requires more effort, and is therefore more harmful than low speech.

In incurable patients the treatment of severe dysphagia often becomes of the greatest importance. Mr. Scott Stevenson had found injection of the superior laryngeal nerve effective in 50 per cent. of cases; the good results obtained in a smaller series by Forrestier Raine and A. L. Banyai, who expose the nerve under local anæsthesia, inject it with alcohol, crush, and divide it, were noted in our issue of Sept. 9th, p. 605. The suggestion made by Sir James Dundas-Grant[1] that the sensitive spot should be found with a probe and treated by cautery-puncture is well worth trial before more drastic measures are taken to alleviate pain. In cases of extensive infiltration at the upper aperture the pain is often intense; in these the removal with punch forceps of the free part of the epiglottis or of part of the swollen arytenoid, as advised by Mr. Barwell, gives great relief and causes but little disturbance to the patient. In incurable cases such relief should be a primary consideration and is too often neglected. But the decision between curable and incurable cases is not always easy to make. The factors influencing prognosis were set out by Dr. F. R. G. Heaf, who pointed out that the patient's resistance, temperament, symptoms, and habits must be considered as well as the local condition. He attaches much importance to the information derived from serial examinations of the blood; in his experience a rapid sedimentation-rate, with a high monocyte and low lymphocyte and eosinophil counts, indicates a poor look-out. The discussion generally showed the value of detail in the treatment and management of this disease, the cure of which demands careful attention from the doctor, fortitude from the patient, and a large measure of patience from both.

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[1] THE LANCET, 1932, ii., 999.

ANNOTATIONS

ADMINISTRATION OF THE CHILDREN ACT

In order to facilitate the execution of the Children and Young Persons Act which comes into force in November, the Home Office has circularised justices and others concerned with the future administration of the law. The circular is designed to bring into relief the main points of the Act—its advance on the old Act and the facilities for treatment of juvenile offenders and young offenders needing care. The circular persistently lays claim to the official recognition of the need for studying the individual child and his circumstances, but nowhere in its pages can be found any fundamental understanding of the social and psychological processes making for delinquency. In the spate of administrative details which the circular naturally contains, there are of course details which indicate the advances in the oiling of administrative wheels and in easing the path of magistrates. The provision of a panel of special magistrates is a wise change, and the call for younger presidents of juvenile courts is a recognition of the need for modern minds in touch with the needs of youth. While the terms "conviction" and "sentence" are to be eliminated, as "reclamation" should be the object of the new Act, there is insufficient evidence that its framers have any clear conception of the implication of this term. Throughout one is made conscious of the fact, as the circular itself states, that there is no change of principle. Few indeed were so optimistic as to hope for such a change, but unless the elimination of the words "conviction" and "sentence" has no meaning, it can only indicate that the law regards the offences of children as different from the offences of adults. Some psychopathologists and sociologists would admit of no distinction between juvenile and adult delinquency, but taking the Act as it stands as a piece of legislation for juvenile offenders, it suggests that those who framed it feel that principles are involved but fear to admit what would call for a complete change of attitude and a clean cut with traditional usages. Scientific detachment, however, would go further and add that while recognising the humanitarian pressure which has formed the new vocabulary and the new provisions, the Act still fails to recognise the advances in psychological and social understanding of crime, and in addition fails to avail itself directly and officially of institutions and doctors who have made the subject their special study.

One of the manifestly valuable sections of the Act to which the attention of magistrates is directed is the Section 61 with regard to the extended power of the court to deal with those who are beyond the care of their parents. All who may need protection are now to be provided for. But while the court can dispose of such children in foster homes and institutions—and such children are frequently without either social or psychological defects—the parents are in need of attention. A special type of probation officer with specific training is called for here, to deal with social and psychological problems of the parents. With regard to remand homes, responsibility is now placed in the hands of local authorities rather than the police, but it will need doctors and social workers with really expert knowledge to diagnose the factors involved and deal with the situation. By raising the age of admission to such homes we shall however create fresh problems, such as the mixing of adolescents with children, which may be dangerous in the absence of careful classification. Parliament decided that juveniles of unruly or depraved character should be liable to imprisonment if found to be unfit for detention in custody in a remand home. The memorandum gives the unfortunate impression of emphasising the distinction between special cases of unruly or depraved conduct and so-called minor delinquency. The moral revulsion which these special cases may produce must be admitted, but it would be unscientific to deal differently with such cases, and perhaps unmerciful too. The difficulty which must arise constantly, at any rate for many years to come, is that the Home Office is obliged to work through magisterial and judicial tribunals for the most part accustomed to old-fashioned ideas of penology and retribution. Better coördination must await the establishment of more widespread confidence in the results to be obtained by the application of modern conceptions of psychopathology in the treatment of juvenile delinquents. To this end the magistrates should be told not merely of the cogs of a new administrative machine, but also of the existence of methods, personnel, and institutions which are capable of dealing with larval and established delinquency, and of affording educational facilities to probation officers who are only too eager to learn the principles of the new orientation in the sociology and psychology of crime. Naturally some of the new juvenile courts will show themselves more progressive than others. Successful experiment will stimulate advance; indeed, the new procedure does but follow where some of the London courts have already led. Psychiatric methods are, according to the recent reports of the Prison Commissioners, already tentatively applied to certain inmates of penal institutions. Treatment, be it noted, is deferred until the patient has been labelled a criminal. The Children and Young Persons Act marked a cautious step forward at a moment when the rigours of national economy grudged any form of fresh public expenditure. Money is wanted for the establishment of special observation centres. The Magistrates' Association has foreshadowed the promotion of a new Bill for this purpose.

A DENTAL PIONEER

William Dall, who was a great craftsman of a type which has never been common in dentistry, died this year, and the materials for his book[1] which were collected for publication as long ago as 1911 have been revised by his widow with the assistance of Mrs. Lindsay. The work thus makes a somewhat belated appearance. It has interest as a pious memorial to a brilliant technician and a pioneer in the application of porcelain to the conservation of teeth and as a contribution to the history of the evolution of porcelain in operative dentistry, but as a practical contribution to modern methods of filling teeth it is of little value. In 1911 Dall's methods marked an advance and gave to the profession new ways of treating the ravages of caries or the results of injury. But the whole trend in the development of porcelain as a filling material has been in the direction of fused porcelain from high fusing body. It is this method which has made possible that highest form of æsthetic restoration, the jacket crown. Dall's method consisted of constructing inlays out of ground porcelain and, by means of special burs, of shaping the cavity so that the inlay fitted it. This entailed the destruction of sound tissue, often avoided by the use of plastic materials or fused inlays. The destruction of sound tissue to make the cavity fit the filling is a serious defect in Dall's method and one which makes his technique, except very occasionally, obsolete and unsound. To those desirous of learning how the technical side of dentistry has evolved, there is much here that is of interest. It is impossible not to admire the ingenuity with which Dall adapted his technique to a variety of conditions. The introduction of translucent cement materials, despite their comparative impermanence, has made porcelain inlays, whether ground or fused, almost a forgotten art. The appearance of this book may serve to recall to an indifferent generation that high fusing porcelain body, though demanding a high standard of craftsmanship, can in suitable cases give results unequalled for beauty and permanence. The ground inlay as invented and advocated by Dall is unlikely ever to come into fashion again, though here and there some enthusiast may use it and, like Dall, obtain excellent results with it.

RESECTION OF THE THORACIC ŒSOPHAGUS

THE short expectation of life of the average patient after extirpation of an œsophageal cancer renders him a poor subject for the elaborate operation of œsophagoplasty, although it has often proved successful in cases of simple stricture of the tube. Wendel[1] in a recent paper states that there are records of more than 150 such interventions; but whether colon, jejunum, or a portion of the stomach is employed, it is only after a series of operations, often spread over a period of more than a year, that natural swallowing becomes possible, and the number of really satisfactory functional results is very small. No carcinoma patient has ever survived such attempts and in the world literature there are perhaps only two cases in which natural swallowing was restored following extirpation of carcinoma of the œsophagus. In one case H. Lilienthal (1921) was able to employ a short skin tunnel posteriorly, and in the other E. Gohrbrandt (1927) restored continuity by direct suture after extirpation of a growth in the lower œsophagus, operation being carried out from below the diaphragm.

Two methods have been used fairly extensively in man to avoid the difficulties of œsophageal anastomosis. Almost 20 years ago F. Torek excised a carcinoma of the thoracic œsophagus together with the oral end of the tube which he brought out in the neck, leaving the patient with a permanent œsophageal fistula in this site. The patient survived and nutrition was ensured by means of a rubber tube which joined the œsophageal fistula in the neck to a gastrostomy opening. This type of operation has been repeated with occasional success by other surgeons. F. Sauerbruch has worked along different lines, using an invagination method designed to avoid soiling the operation field. The œsophagus is crushed and ligated above and below the growth, which is then invaginated into the stomach, and natural separation is awaited. The final cure of a patient by this means has not yet been attained.

In a recent Hunterian lecture L. O'Shaughnessy[2] discussed some of the difficulties which had attended surgery of the œsophagus and described a method of resection in which an omental graft was employed to ensure safety of the suture line. In his experiments linen thread was used and, in order to avoid tension on the anastomosis, a partial dislocation of the stomach into the left chest was carried out. Now R. Ingebrigtsen has recorded[3] one of the most remarkable series of animal experiments in the literature of the œsophagus. He was able to resect portions of the thoracic œsophagus in seven cats, restore continuity, and obtain healing in all cases. In an earlier series of experiments he had found that catgut sutures conveyed infection from the lumen to the surrounding parts by means of a process of imbibition, and he attributes his present success to the use of fine silk saturated with paraffin as a suture material. In his animals Ingebrigtsen was able to restore continuity after resection of four centimetres of the tube, and he suggests that in man approximation after the loss of eight centimetres should be possible. He has employed his suture clinically in the cervical œsophagus and obtained immediate healing of wounds. The case in which Sauerbruch[4] carried out a transpleural resection of the lower end of the œsophagus and restored continuity by end-to-end anastomosis is mentioned as a parallel in human surgery to Ingebrigtsen's experiments.

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[1] Ground Porcelain Inlays. By William Dall, L.D.S. R.F.P.S. Glasg. London: Henry Kimpton. 1933. Pp. 196. 21*s.*

[1] Arch. f. klin. Chir., 1929, clvii., 295.
[2] Med. Press and Circ., 1933, cxxxv., 150.
[3] Act. chir. Scand., 1932, lxxxi., 446.

It seems unlikely, however, that resection and end-to-end anastomosis of the human œsophagus for carcinoma will be possible unless a dislocation of the stomach through the diaphragm is carried out. The possibility of mobilisation of the stomach is illustrated by a patient described by O. Kirschner (1920) who survived after the viscus had been displaced upwards to the level of the clavicle, and in the case of a tumour at the lower end of the œsophagus such extreme dislocation would not be required. An intervention of this type will always carry a high mortality, but at least, at the cost of a single operative ordeal, it offers to the survivor the continuance of a normal existence.

NORMAL COLOUR VISION

THE summary of experimental work on colour vision prepared by Mr. W. O'D. Pierce for the Medical Research Council[5] is welcome, if only because the author has dared to break the tradition of writers on the subject that a new theory must be advanced with every publication. Mr. Pierce has sifted and summarised the work done since 1910 on the normal variations in colour vision in different individuals. This is a matter of the utmost importance, for the range of variation among normal individuals is considerable. Moreover the older observers were not always alive to the discrepancies in colour vision under slight variations of illumination, pre-exposure, fatigue, and other extraneous factors. Much of the earlier work is therefore of doubtful value, and yet incontrovertible data on the normal and its variations are essential for any understanding of colour blindness and the practical problems bound up with it. In the elaboration of normal standards for such a purely subjective thing as colour vision, uniform experimental conditions are thus an obvious requirement; but it is also necessary to realise that even with the most rigid control, individuals will give different responses in different experiments. These are *individual variations*, and have to be distinctly separated from the response of different people—*individual differences.*

Fifty years ago Lord Rayleigh showed that when different people are asked to match a homogeneous yellow with a mixture of homogeneous red and green, some people require much more red and others much more green than the normal. The Rayleigh equation has been responsible for much speculation and for many attempts in the classification of colour defectives. The general assumption has been that the people who require more of a green colour to produce matching mixture are partially blind to that colour, and graduations in colour blindness have been held as proved by these observations. It is interesting to note that recent work has departed radically from this view. Hess, Oloff, and others speak of supernormal sensitivity to colour. It is held that many who have been classed as colour weak, because they do not accept the normal Rayleigh equation, have really required an excess of the colour in question to mask their greater sensitiveness for the complimentary colour. In this view people are "red-sighted" rather than green-blind, "green-sighted" rather than red-blind, and so on. Hess quoted a case of an oculist who was over-sensitive to red and had normal sensitivity to green; he could not pass the Stilling test, but in the spectroscope test he could go beyond the normal limits for red. How far this more positive view of colour defects will help to disentangle the difficulties of colour vision remains to be seen.

Another direction from which valuable data have come is the study of the development of the colour sense in children. It appears that children below the age of 3 tend to match on form rather than colour, whilst between the ages of 3 and 6 colour is preferred to form. Curiously enough at the age of 6 form is once more preferred, and the influence of colour increases steadily up to the adult level—which, incidentally, is low, for only 10 per cent. of adults choose on colour. Appreciation of colour makes its appearance early in life. Working with a large number of infants ranging in age from 69 days to 2 years and with older children and adults as controls, it was found by Staples that colour is distinguished from grey at the age of 3 months, becoming an increasingly effective stimulus until the end of the fourteenth month. Probably by 12, and certainly by 15 months, red, yellow, blue, and green are seen clearly, though preference for different colours is shown. Even at this early age a sex difference in colour vision is noticeable; girls lose interest in yellow and gain it in blue, which is at its maximum effectiveness at 9 months. Baby girls also show a readier response to colour in general than do boys.

THE NURSE'S RISK OF TUBERCULOSIS

IT is only of late that certain hospitals have squarely faced their responsibilities in relation to the tuberculosis risks run by their nurses. In the past little has been done to determine the exact degree of these risks, and indeed, as we observed last week (p. 659), it is difficult to devise methods to prove whether or not the nursing care of the tuberculous really is a hazardous occupation. It is therefore not surprising that the measures designed to reduce the risks have been of a general rather than a specific character. If, however, hospital nurses are specially liable to contract tuberculosis, it is evident that appropriate precautions must be taken. The pioneer work of Heimbeck and Scheel at the communal hospital of Ullevaal in Oslo in this field is stimulating investigations on similar lines elsewhere, and in *Hospitalstidende* for June 29th there is a paper by Dr. C. J. Jacobson on the tuberculosis morbidity and the Pirquet test in nurses in a Danish general hospital with a tuberculosis division. Here it has been the practice since 1927 to subject every newcomer among the probationer nurses to a systematic physical examination which includes the Pirquet test. If it is negative, it is repeated eight days later, and, if still negative, at half-yearly intervals till it becomes positive. As long as it is negative, no nurse is allowed to work in the tuberculosis division. Even the positive reactors who are employed in this division are carefully examined, both at the beginning and on the conclusion of their work here. Radiograms are taken of the lungs of every new probationer, and the sedimentation test is also systematically employed. Of the 149 probationers examined during the period 1928–1932, as many as 116 gave a positive Pirquet reaction at the first test, and 15 became Pirquet positive within six months of the commencement of their duties. These findings are notably at variance with those of Heimbeck, who found about 50 per cent. of the probationers examined to be Pirquet negative. The marked differences in the density of the population of Denmark and Norway may perhaps account for the lack of conformity in these observations. While Heimbeck has found a negative Pirquet reaction to be of ill omen to a probationer as far as her expectation of tuberculosis is concerned, Jacobson considers his own findings in this respect too uncertain to warrant any general conclusion.

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[4] Arch. f. klin. Chir., 1932, clxxiii., 457.

[5] Individual Differences in Normal Colour Vision: a Survey of Recent Experimental Work, 1910–1931. Special Report Series No. 181. London: H.M. Stat. Office. Pp. 96. 2s.

RESEARCH ON GONOCOCCAL INFECTION

A COMMITTEE has been formed in America by the division of medical sciences of the National Research Council, in coöperation with the American Social Hygiene Association, with the purpose of collecting, analysing, and collating our present knowledge of the gonococcus and gonococcal infections, especially as regards bacteriology, pathology, immunity, mechanism of infection, and some of the forms of therapy. At the close of the preliminary survey this committee, with the assistance of a conference of experts, will compile a report with the object of stimulating interest in the study of the gonococcus, of providing a point of departure, and of suggesting promising leads for further investigation. The survey will cover published work and include studies which were incomplete or whose results were inconclusive at the time of its appearance. Dr. Stanhope Bayne-Jones, chairman of the committee, invites coöperation from all workers interested in this field; other members of the committee are Dr. Edward L. Keyes, Dr. Walter Clarke (secretary), and Dr. Francis Blake, chairman of the division (ex officio). Communications and reprints may be addressed to the secretary of the Committee for Survey of Research, Room 1101, 450, Seventh-avenue, New York.

CHRONIC ILLNESS

THE lack of classification in the provision for the care of the chronic sick in this country must imply waste of effort. Attempts are now being made by the London County Council, King Edward's Hospital Fund, and other bodies to organise certain hospitals offering facilities for their accommodation and treatment, but we have still no institution such as the Montefiore and others in the United States which are adapted solely for research into as well as treatment of chronic diseases in general. A vast amount of information on chronic disease as manifested in New York City can be obtained from the results of a survey recently made by the Welfare Council of the City.[1] A census was taken of all persons, excluding those suffering from pulmonary tuberculosis, mental disease, blindness, and deafness, "who have been or are likely to be incapacitated by disease for a period of at least three months and whose incapacity will probably continue for an indefinite period" and who were under the care of medical or social agencies in New York City in a given week in 1928. It is estimated that these represent about one-third of the total chronic sick and hence that about 1 per cent. of the population of New York are thus incapacitated. Among other surprising conclusions it was found that chronic illness is by no means largely a prerogative of old age, nearly half the sufferers being under 40 years old. The chief obstacles to progress were considered to be the prevalent idea that "chronic" was synonymous with "incurable" and also the natural leanings of the medical profession towards the pitched battles of acute disease rather than the trench warfare of chronic complaints. Broadly speaking three types of care are considered to be required: "A" or active medical care for diagnosis or treatment; "B" or skilled nursing care; and "C" or custodial care by a competent attendant. On several grounds, among them the fact that attention paid to public health pays large dividends, there is a trend towards more and more official responsibility for those chronically ill and it is being increasingly recognised that mere herding into institutions goes no way towards solving this problem. In New York at any rate it is held that a definite campaign is needed to create public recognition that the chronic diseases offer the next great field in public work to be cultivated and that the responsibility of society is at least as great toward the chronic as toward the acute sufferer. One of the difficulties in this country in research on chronic cases is that trained nurses are no more ready than doctors to spend their lives attempting to alleviate the discomforts of chronic patients, and it is by no means easy to secure and retain a nursing staff of the necessary standard of skill and intelligence.

THE PREVALENCE OF NARCOTIC ADDICTION

ALARMIST statements have recently appeared in daily papers about "the drug traffic that cannot be checked" and "the lengthening death-roll from narcotics." In one of these it was alleged that the addicts in this country number no fewer than 25,000, and that morphine and opium victims are increasing. But it is, in fact, not possible to arrive at any satisfactory estimate of the number of addicts in this country, for no notification or registration system, such as has been attempted in other countries, exists here. In the absence of any census of addicts, which indeed is hardly practicable, recourse can only be had to other sources of information in order to gain some notion of the extent of addiction to narcotic drugs in any community. In 1926 a departmental committee of the Ministry of Health, in reporting upon addiction to morphine and heroin, after taking evidence from medical men and others stated that "in this country addiction to morphine or heroin is rare," that morphine was more frequently the cause of such addiction, and that "a relatively high proportion of cases occurs among those who, by reason of their occupation or otherwise, have special facilities for access to the drugs." This committee were further of opinion that addiction in this country is diminishing, and that this "is largely attributable to the restrictions imposed by the Dangerous Drugs Acts." In 1932 the Home Office, in its annual report to the League of Nations, in accordance with the Opium Conventions, asserted with confidence that "drug addiction is not prevalent in Great Britain," that only 69 prosecutions had taken place under the Dangerous Drugs Acts, 1920–25, and that seizures of smuggled drugs had been few and inconsiderable in amount. It has, of course, to be remembered that addiction may continue for long unsuspected, that its victims are ingeniously secretive, that illicit traffic in morphine, heroin, and cocaine may easily escape detection, and that the peddling of these narcotics, especially in the underworld of large cities, is apt to elude official vigilance. Nevertheless, there is sufficient ground for believing that in this country narcotic addiction is probably less prevalent than on the continent or in the New World, and that thanks to the honest endeavour to give effect to the International Conventions of 1912 and 1925 by legislative and administrative effort, the illicit use of opium, morphine, heroin, and cocaine is less than was the case a few years ago.

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[1] Chronic Illness in New York City. By Mary C. Jarrett. Columbia University Press. 1933. Two volumes. Pp. 545 and appendices. 25s.

THE LATE PROF. FÜLLEBORN

The death on Sept. 9th of Prof. Friedrich Fülleborn means much to those who knew him as director of the Tropical Institute at Hamburg, of which he was one of the founders in 1901. A scientist of international reputation, he will chiefly be remembered for his pioneer work in helminthology, in which he was a worthy successor to Loeckhart and Loose, but his studies on anthropology and pure zoology are equally well known. In 1926 he was appointed to the chair of tropical medicine in the University of Hamburg, and two years ago, on Nocht's recommendation, he became director of the institute. He saw a good deal of military service as regimental medical officer in the Herero war and in East Africa; called up for service in 1914 he found himself immediately at the front and was badly wounded, afterwards serving as a malaria expert on the Balkan front. Fülleborn was one of the earliest pupils at the London School of Tropical Medicine, and remained throughout his life a staunch admirer of Patrick Manson. He was a good judge of human nature, a connoisseur in art, and a confirmed epicure. He was well known in every country in Europe and America, and was particularly welcome in England when he returned after the war on a kind of pilgrimage to visit the shrine of Manson—and also, he would jocularly remark, to partake of a saddle of mutton at Scott's. He was a corresponding member of the Royal Society of Tropical Medicine and of the Royal Society of Medicine.

EXERCISE AND PREVENTIVE GYNÆCOLOGY

Some exercises for pregnant and puerperal women are set out in detail on another page, not because they could safely be prescribed for the patient's use without expert supervision, but in order to show the plan on which they have been designed. The stress laid on correct posture is in itself of value to the prospective mother even more than to the rest of the community, and exercises for mobilising and relaxing groups of muscles provide excellent training in control. It is to be noted that many of the movements are made in the lying, kneeling, and sitting positions, when the weight of the body does not rest upon the lower limbs. In treatment devised for visceroptosis and prolapse the legs and pelvis are raised and supported. Exercises are mostly performed to gramophone records, stress being laid on their æsthetic side. The hope of expediting the return of her figure to normal after childbearing will encourage a patient to persevere with exercises during pregnancy, which are performed in such a position that venous engorgement of vulva or legs is not increased. The merit of the so-called "delivery exercise" is possibly more psychological than physical. The feeling that she is doing something in advance to help herself over the crucial moment, that she has at least familiarised herself with the posture she will be asked to take up, and with the kind of effort she may be asked to make will in itself bring a measure of confidence to a prospective mother. The attempt to promote lactation by arm movements has the advantage over massage that no direct pressure is made over the breast, and that risk of accidental infection of the nipple is almost negligible. Practice in contracting the sphincters and levator ani is certainly likely to help to restore tone to the muscles of the pelvic floor after childbirth. We understand that while some women find these exercises tedious, others welcome them as an agreeable diversion, and that the latter are in the majority.

TUBERCULOSIS CONTROL IN AMERICA

A clear and complete description of the measures taken for the control of tuberculosis in an important urban district has been provided by Dr. B. Goldberg.[1] The American administrator is faced with one difficulty, which does not concern his English colleague. The members of a European community, being mainly of the same race, exhibit a similar degree of immunity to tuberculosis as the result of past racial infection. The large admixture of native races specially susceptible to the more acute types of tuberculosis in American urban communities raises difficulties which must be a constant source of embarrassment to the public health authorities. Thus in 1930 the tuberculosis mortality among the negroes of Chicago was more than five times larger than that among the non-coloured citizens. The position is in some areas even worse with regard to the Mexicans who have entered the country in recent years to supply the cheap labour displaced by the restriction of the immigrants from Europe. The problem of tuberculosis among Red Indians has ceased to be one of any importance, for that noble race is now almost extinct. Civilisation offered a poor exchange when the first of the gunmen replaced the last of the Mohicans.

It is to be feared that Dr. Goldberg's description of the powers with which a medical officer of health is armed will induce a feeling of envy in the mind of the corresponding English official, whose only weapon is a regulation concerning compulsory removal which is hardly ever, if ever, enforced. The Illinois Department of Public Health evidently knows how to deal with the recalcitrant. The careless consumptive who cannot be segregated at home is either removed to hospital or effectively isolated at his residence, where a large red placard is posted informing the public that here is a centre of infection and advising the visitor (in block letters not less than two inches in height) to "keep out." Chicago has a rule that no child under 16 years of age may share the same home or apartment as an "open" case of pulmonary tuberculosis, and Dr. Goldberg assures us that this rule is enforced. It is gratifying to note that in 96 per cent. of cases segregation is assured by a friendly adjustment between health official and patient. Social workers are too apt to forget that reasonable discipline directed without fear or favour towards the public welfare provokes little resentment. Timidity of approach is fatal in the management of public health problems. Dr. Goldberg provides interesting descriptions of the modern tuberculosis dispensary in all its departments, and describes recent developments in the planning and conduct of sanatoriums; the chapters which deal with these subjects contain much information which may be profitably applied to similar institutions in this country. The English reader will enjoy the racy sections which discuss educational methods for the masses, and include radio addresses, while retaining his conviction that many of the methods of propaganda described could not be used effectively in this country.

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[1] Procedures in Tuberculosis Control. By Benjamin Goldberg, M.D., F.A.C.P., F.A.P.H.A., Associate Professor of Medicine, University of Illinois; formerly Medical Director, City of Chicago Municipal Tuberculosis Organisation. With a chapter on Sanatorium Planning by Thomas B. Kidner, New York City, and an introduction by David J. Davis, M.D., Ph.D., Dean of the College of Medicine, University of Illinois, Chicago. Philadelphia: F. A. Davis Company. 1933. Pp. 373. $4.

TRICHOMONAS VAGINITIS

Trichomonas vaginalis was discovered in 1837 by Donné, and was at first regarded as a harmless occasional inhabitant of the vagina. It is a flagellate protozoon which varies in size from a little larger than a polymorphonuclear leucocyte to a little smaller than a vaginal epithelial cell. The question of its pathogenicity has been discussed for many years. It is often found in women in whom the vaginal secretion is normal; but the same can be said of staphylococci and hæmolytic streptococci, which are undoubtedly sometimes the cause of vaginitis. L. Nürnberger, writing in the Veit-Stoeckel "Handbuch der Gynäkologie," regards the organism as pathogenic because five women with vaginitis were found in whom cultures grew only trichomonas and Döderlein's bacillus; in one case a pure culture of trichomonas was obtained from the posterior fornix. In the great majority of patients other organisms are also present in large numbers, serving as food for the trichomonads, and some observers have maintained that the protozoon only invades an already unhealthy vagina, and is not the primary cause of the inflammation. H. Close Hesseltine has recently supported this view.[1] He found a non-hæmolytic streptococcus always present, and states that it is capable of producing the typical "trichomonad vaginitis" in the absence of trichomonas. Most authors, however, believe that trichomonas is itself sometimes pathogenic, causing acute inflammation, with numerous small red areas on the vaginal walls and the portio vaginalis of the cervix, and a characteristic profuse yellow and offensive discharge, which is frequently frothy, and contains enormous numbers of the protozoon. The patient usually complains of pruritus, and the vulva and the adjacent portions of the thighs may be excoriated. The diagnosis is made by the immediate microscopic examination of a drop of discharge diluted with warm saline on a warmed glass slide. The motile organisms can be identified under a $\frac{1}{6}$ in. objective, but the flagellæ are better seen with an oil immersion lens and dark-ground illumination.

Trichomonads are also sometimes found in the colon and rectum, the bladder, and the mouth, and it is uncertain whether the vaginal type is a distinct species. The source of the infection is difficult to determine, and there is very little evidence about its mode of spread. I. F. Stein and E. J. Cope[2] found very few women with trichomonad vaginitis who had the organism also present in other situations, and they concluded that the vaginal and other strains were distinct. Clinically, there is some evidence that reinfection of the vagina from the rectum and bladder is possible, and this may be one reason for the difficulty in curing the disease. Trichomonas has also been found in the prostatic secretion of a man whose wife had the typical vaginitis. Treatment is liable to be unsatisfactory, and the discharge is especially prone to recur after menstruation, which seems to favour the development of the organism. Nürnberger advises thorough cleansing of the vagina with soft soap, followed by swabbing with a 1/1000 aqueous solution of perchloride of mercury, and the application of a boro-glycerine pack. Mercurochrome, methylene-blue, brilliant green, formalin, Lassar's paste, and quinine sulphate have been recommended by various authors. They all kill trichomonas rapidly on contact, but often fail to prevent recurrence of the disease. Hubert Jacobs[3] has found application of a preparation of hexyl resorcinol to the vagina, followed by a lactic acid douche, to be the most effective measure.

Dr. Goodall, in the communication published in THE LANCET last week, advises yet another method, that is, vaginal cones of 1 per cent. picric acid, which have the advantage that the antiseptic is present in the vagina for long periods and can penetrate all over the cavity. Mere swabbing with picric acid is ineffective because it is almost impossible to cleanse the entire surface of the vagina, and living trichomonads will remain between the rugæ. Dr. Goodall advocates his method as a specific cure for this troublesome infection, noting that the possibility of a patient's intolerance to picric acid must be borne in mind. The chief difficulty, however, must be to persuade patients to use the cones. The indelible stains caused by the antiseptic may cause them to refuse to carry out a treatment the effectiveness of which depends entirely on their coöperation.

A NEW MAMMALIAN HEART PREPARATION

IN physiological and pharmacological investigations on the heart two preparations have hitherto been in vogue, namely, the isolated heart perfused via the coronary vessels, and the heart-lung preparation of Starling. Both have been fruitful in results, but both have limitations. The former is simply a flaccid muscle perfusion, in which the heart does no external work; the latter is complicated by the presence of the lungs, the behaviour of whose vascular bed is an uncontrollable factor rendering difficult the interpretation of pressure and other records. Up to now it has been impossible, owing to technical difficulties, to make a preparation in which the heart pumps blood in the normal way, and yet where the whole circulation is completely under the control of the operator. I. de Burgh Daly and W. V. Thorpe,[4] replacing the lungs by a mechanical oxygenator, appear recently to have overcome these difficulties, and their preparation, besides ranking as a technical achievement of high order, should throw light on many physiological and clinical problems. The left and right sides of the heart can be studied separately, and the amount of work done by each measured; moreover, the individual loads can be varied at will. By overloading one or other side of the heart it should be possible to compare the embarrassment of the heart resulting from obstruction to the pulmonary circulation (e.g., as in emphysema) with that following, say, injury to the aortic valve. Also, by comparing the behaviour of this isolated heart with that of the heart of a heart-lung preparation, it may be feasible to estimate the part played by the lungs in various conditions; for instance, how far they act as a blood reservoir in mitral disease, or, as the authors themselves suggest, how they affect the filling of the heart when the intrathoracic pressure is reduced. The ignorance as to what precisely happens to the circulation when a deep breath is taken is largely due to the fact that the pulmonary capillaries as well as the heart must be affected by the changed conditions inside the chest, and in their turn must secondarily influence the heart action. A further useful feature of the preparation is that the coronary blood flow can be accurately measured without further complicated apparatus or insult to the heart. It should therefore make it possible to gain a very clear picture of the action of drugs and toxins. It will not only be evident whether they dilate or constrict the coronary arteries, but how they affect the coronary circulation as a whole. More important still, the effects of such alterations in coronary blood-supply, and of the drugs themselves, will appear on the records of output and work done by the two sides of the heart. These records will be capable of direct interpretation, coincident effects on the pulmonary circulation having been eliminated. It is a temptation to enlarge upon the possibilities of a new technique, but its potential value is best known to its inventors, and its application must be left for the time being in their hands. It seems to us, however, that although the life of this particular preparation is limited to a single day, and the experiments performed with it necessarily of an "acute" character, it may result in more interest in the heart as a dual organ, the two halves of which are subject to different stresses and strains to which they may react individually.

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[1] Amer. Jour. Obst. and Gyn., July, 1933, p. 46.
[2] Ibid., June, 1933, p. 819.
[3] Med. Jour. Australia, July 22nd, p. 111.
[4] Jour. Physiol., 1933, lxxix., 199.

OPENING OF THE MEDICAL SCHOOLS

IN connexion with the opening of the session at the London medical schools the following arrangements are announced:—

Charing Cross Hospital.—Prizes will be distributed on Friday, Sept. 29th, at 4 P.M., in the hospital by Dr. W. Langdon Brown, regius professor of physic in the University of Cambridge, with Dr. Gordon Holmes in the chair. On the following Saturday and Sunday (Sept. 30th and Oct. 1st) there will be a week-end post-graduate course, admission being restricted to old students of the hospital. On Saturday, at 7.30 for 8 P.M., the annual dinner of past and present students will be held in the Café Royal (Louis XVI. Suite), Regent-street, W., Dr. William Hunter presiding.

Guy's Hospital.—On Tuesday, Oct. 3rd, at 3 P.M., the prizes will be distributed by Sir Gowland Hopkins, professor of biochemistry in the University of Cambridge, who will deliver an address. The old students' dinner will take place on Friday, Oct. 20th, at 7 P.M., in the Connaught Rooms, Great Queen-street, Kingsway, W.C., when Mr. C. H. Fagge will be in the chair.

King's College Hospital.—On Saturday, Sept. 30th, from 2–6 P.M., there will be lectures and demonstrations open to all practitioners as well as to members of the medical school. Practitioners are also free to attend the series of post-graduate lectures to be delivered in the lecture theatre of the medical school on Thursdays at 9 P.M. from Oct. 12th onwards, and a special course in preventive medicine (see page 726) on Thursdays at 4.30 P.M. The annual dinner of past and present students will be held on Saturday, Sept. 30th, 7 for 7.30 P.M., at the Connaught Rooms, Great Queen-street, Kingsway, W.C., Mr. Arthur Edmunds presiding.

London Hospital.—A post-graduate course for former students of the hospital only will be held from Oct. 11th to 14th inclusive. The old students' annual dinner will be held on Thursday, Oct. 12th, at the Trocadero Restaurant, Shaftesbury-avenue, W., at 7.30 for 8 P.M. The chair will be taken by Dr. P. N. Panton, director of the Hale Clinical Laboratory.

Middlesex Hospital.—The winter session will be opened in the Queen's Hall, Langham-place, W., on Tuesday, Oct. 3rd, at 3 P.M., when Prof. E. C. Dodds, director of the Courtauld Institute of Biochemistry, will deliver the introductory address on Diet, Exercise, and Weight, and Sir Holburt Waring, president of the Royal College of Surgeons, will distribute the prizes. A "refresher course" for former students of the hospital only will be held from Sept. 29th to Oct. 3rd. On Tuesday, Oct. 3rd, the annual dinner will be held at the Savoy Hotel (Embankment entrance) at 7.30 P.M.

Royal Free Hospital.—On Monday, Oct. 2nd, at 3 P.M., Sir Farquhar Buzzard, regius professor of medicine in the University of Oxford, will deliver the opening address and distribute the prizes at the London (R.F.H.) School of Medicine for Women. The annual dinner will be held on Thursday, Dec. 7th.

St. Bartholomew's Hospital.—The old students' dinner will be held in the great hall of the hospital on Monday, Oct. 2nd, at 7 for 7.30 P.M. Lord Horder will be in the chair, and the guest of the evening will be Mr. Ramsay MacDonald.

St. George's Hospital.—The prize distribution will be held on Monday, Oct. 2nd, when Dr. James Collier will deliver an address on Fashion in Medicine. A post-graduate course for former students of the hospital is being held from Sept. 29th to Oct. 2nd. The annual dinner will take place on Monday, Oct. 2nd, at 7.15 for 7.45 P.M., at Claridge's Hotel, W. Dr. Henry Robinson will be in the chair.

St. Mary's Hospital.—A week-end post-graduate course, open to all medical practitioners without fee, will be held from Sept. 29th to Oct. 1st in the library of the Old Medical School. The annual dinner of past and present students will take place at the Trocadero Restaurant, W., on Saturday, Sept. 30th, at 7.30 P.M., when Dr. Reginald Miller will be in the chair.

St. Thomas's Hospital.—A short post-graduate course for former students only will be held between Sept. 25th and Sept. 29th. The old students' dinner will take place at the Dorchester Hotel, Park-lane, W., at 7.15 for 7.45 P.M. on Sept. 29th, Dr. Charles Box presiding.

University College Hospital.—On Monday, Oct. 2nd. at 3.15 P.M., in the library of the medical school Prof. A. E. Boycott will deliver the opening address. The annual demonstrations for old students will take place on Oct. 12th and 13th. The annual dinner will be held at the Hotel Victoria, Northumberland-avenue, on Oct. 13th at 7.15 P.M.

Westminster Hospital.—On Monday, Oct. 2nd, at 3 P.M., the winter session will be opened in the board room of the hospital, when Prof. W. Langdon Brown will give an inaugural address on The Return to Æsculapius, Sir Henry Hadow presiding. A short intensive post-graduate course for former students of the hospital will be given on Saturday and Sunday (Sept. 30th and Oct. 1st). The annual dinner of past and present students will take place at Grosvenor House, Park-lane, W., on Saturday, Sept. 30th, at 7 for 7.30 P.M., Dr. Eric Gandy will preside.

Royal Dental Hospital.—Prizes will be distributed at the hospital on Friday, Oct. 6th, at 8 P.M., at a conversazione over which Sir Holburt Waring will preside. The annual clinical At Home will be held at the hospital on Nov. 25th, and the dinner of past and present students will take place on the same evening at the Trocadero Restaurant, Shaftesbury-avenue, W., when Mr. J. G. Turner will be in the chair.

Details of post-graduate courses will appear in our Medical Diary.

PRINCESS ELIZABETH OF YORK HOSPITAL FOR CHILDREN.—On Friday, Sept. 29th, at 8.45 P.M., Prof. D. F. Fraser-Harris will give a lecture on science and poetry at the hospital, Mr. John Johnson presiding.

PUBLIC HEALTH SERVICES

On the State of the Public Health[1]

THE provisional figure for the population of England and Wales at the April census, 1931, was 39,947,931, and the estimated mid-year population in 1932 was 40,201,000. Thus the improvement in mortality-rate is still managing to keep pace with the falling birth-rate, but stability of population requires a crude birth-rate of 19·5 per 1000, and the present rate is only 4·9, last year being again the lowest on record. The infant mortality-rate (deaths of children under 1 year per 1000 births) fell from 66 to 65. The five principal causes of adult death remain as usual: diseases of the heart and circulatory system head the list, followed by cancer, respiratory diseases, diseases of the nervous system, and tuberculosis. There has been no change in the chief causes of infant death: congenital conditions and premature birth, bronchitis and pneumonia, and diarrhœa and enteritis, but there has been a steady decline of recent years in the two latter groups. Sir George Newman points out that the enormous saving of infant life brings with it the further responsibility of preserving and stabilising the weakly and delicate children who now escape the early death which would have been their fate a generation ago. Suicide has again increased, and its prevention is another responsibility which all the social forces that aim to mould character must assume. There has been a very slight reduction in the number of persons killed in road accidents, but a 2 per cent. increase in the number of injured. During the year a total of 27¼ million weeks' work was lost to the nation by sickness or disablement, as shown by the figures of the approved societies. Over 13 million pounds was disbursed in benefits.

INFECTIOUS DISEASES

The decline in small-pox, scarlet fever, tuberculosis, and diphtheria has been maintained, while cerebrospinal fever and poliomyelitis tend to increase. Two cases of post-vaccinal encephalitis occurred, neither of them proving fatal. The intrathecal or intravenous injection of blood-serum from a recently vaccinated person is a valuable method of treatment which should be widely known, in order that it may be considered as soon as post-vaccinal encephalitis is suspected. Both the cases in 1932 were of the "dangerous age" for primary vaccination: school age or adolescent. During the epidemic of measles in London an investigation was made into the value of convalescent serum in the protection of contacts. The result was that three times as many inoculated children, compared with the control group, escaped the infection. Of the inoculated only 3 per cent. had an unmodified attack, while the corresponding figure in the uninoculated group was 70·5. The only ill-effects were a transient erythema or pyrexia. The preventive dose for children under 3 was 10 c.cm.; for older children the number of years multiplied by 4 c.cm. There is also some reason to believe that broncho-pneumonia in measles may be averted or modified by the timely administration of moderately large doses of potent antiscarlatinal serum.

Whooping-cough is still an important cause of child death, especially among girls. The figures seem to suggest that recovery from an attack is especially associated with physical fitness; country children do better than town children. A factor in whooping-cough that is not always remembered is the psych logical trauma produced by terrifying spasn accompanied by the feeling of suffocation. Expe ments are being made with vaccines, but at prese no absolutely reliable one is available.

The diphtheria of 1932 was on the whole mil The office committee of the Ministry, which w appointed in 1931 to deal with immunisation ar other cognate subjects, has issued a memorandum to medical officers of health pointing out the desir bility of offering all parents the facilities for artifici immunisation and giving details of procedure. considerable stimulus to the work has resulted.

During the year there were 2545 cases of enter compared with 2276 in 1931 and 2952 in 1930. Tl Malton and Denby Dale outbreaks emphasised aga the risk of organic impurity in domestic water-supplie and the report urges on local authorities the vit importance of protecting their water by period survey of sources and bacteriological examination supply. It is now more than two years since tl Epping outbreak ceased, but *B. paratyphosus* ca still be recovered from the sewage effluent. A fe sporadic cases, perhaps weeks apart but recurrin year by year, may be associated with a pollute water-supply and disappear with the establisl ment of a pure one. A certain mental hospit in Yorkshire had "endemic" typhoid from 19(to 1917, when an outbreak was investigated by medical officer who insisted on a new water-suppl Thereupon the incidence ceased. Yet in all thos years only about a dozen clinical cases had appeare in a population of 2000. Early diagnosis is the mos important factor in preventing an outbreak, an Sir George Newman doubts if the amelioration in th clinical character of enteric fever has been properl appreciated; every case of continued pyrexia wit indefinite physical signs should, he says, be prov sionally regarded as one of the enteric group. A outbreaks entail for a time the presence of carrier in the population, but the fæcal carrier, under goo modern sanitary conditions, is far less of a menac than the carrier of droplet infection. The mos satisfactory policy at present seems to be to instruc any identified carriers in sanitation and require ther not to prepare food or drink for others until the cease to carry bacteria.

The 1932–33 influenza epidemic was very wide spread, but not of unusual virulence. No case o psittacosis was reported, *though the disease ma exist unsuspected in British aviaries, and anomalou cases of influenza, enteric, or pneumonia shoul* suggest inquiries in this connexion. Only three case of malaria were verified in 1932, but there were 11 case of anthrax, three fatal. One of the non-fatal case was contracted from the cuffs of a fur coat, sent a a present from Palestine. Epidemic encephaliti seems to be disappearing but poliomyelitis remain important. Opinion is still divided as to the valu of convalescent serum in poliomyelitis. Anima experiments have proved definitely that under certai conditions the convalescent serum can neutralise th virus; it can be obtained free from the L.C.C Western Hospital. The value of serum in cerebro-spinal fever has also been studied. The first dose should be as large as possible: 20 to 40 c.cm. intrathecally, and in some cases prompt treatment means the difference between life and death. The incidence of the disease was above normal in 1932 and does not seem to be diminishing.

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[1] Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1932. H.M. Stationery Office. Pp. 266. 4*s*. A leading article on one aspect of this report appeared in our last issue (p. 657).

[2] Ministry of Health Memo. 170/Med. H.M. Stationery Office. 1*d*.

MATERNITY AND CHILD WELFARE

There were 2587 deaths directly due to child-bearing in 1932, but although the rate from sepsis was slightly less than in the previous year, the rate for other causes was higher than it has been since 1928. The report of the Maternal Mortality Committee, published in August, 1932, received prompt and widespread attention, and the action taken was unusually rapid. The training of medical students and midwives was revised, and the confidential inquiries into maternal deaths, made by the Committee, are being continued by the Ministry. One result of the inquiry is a free discussion which would have been impossible a few years ago; voluntary bodies are doing valuable work in propaganda and teaching.

At the end of 1932 there were 1060 antenatal clinics maintained by local authorities, an increase of 65 during the year. In 35 large towns and boroughs more than half the pregnant women attend these clinics, and in only seven towns were the attendances less than 20 per cent. of the notified births. Thus these clinics are becoming steadily more popular. It is important that they should not become crowded, as an essential part of their work is individual attention and instruction, and a general study of the mother's health, nutrition, and environment. The 2708 health visitors paid 450,179 visits to expectant mothers in their homes during the year. The transfer of poor-law institutions to local authorities supplied a large amount of actual or potential maternity accommodation, and the women are showing no reluctance to avail themselves of it. A municipal maternity service is thus growing up alongside the service under the Maternity and Child Welfare Act, and the two should be speedily unified. The practice of postnatal care is also spreading.

TUBERCULOSIS AND VENEREAL DISEASE

The bulk of tuberculosis patients come from the insured population, and the general practitioner therefore forms the first line of defence. "Why is it," asks Sir George Newman, "that all too often he halts in the delivery of the case?" In answer he gives four reasons: the disinclination of the patient to go to the practitioner; the physical concealment or obscurity of the disease in its early stages; some failure in diagnosis owing to lack of skill and experience or of facilities; and the lack of an active relationship between the practitioner and the tuberculosis officer, who should be adviser, consultant, and clearing-house. Greater coöperation between practitioner and public health officer is declared by the report to be one of the most urgent of all public health problems. The number of deaths from tuberculosis in 1932 was 33,658, the lowest rate on record and a substantial improvement on 1931. The decline was especially marked in pulmonary tuberculosis, perhaps on account of the absence of serious influenza and also of climatic conditions. The decline in non-pulmonary tuberculosis is remarkable; it has amounted to 37 per cent. in the last ten years. The number of new cases notified is also the lowest on record.

The importance of contact examination is being increasingly recognised, as large numbers of new cases are found by investigating the contacts of each known case. This measure is put in the forefront of prevention. In some areas special attention has been paid to the removal of infants and children from the infected homes: the "Grancher system," particularly favoured in France. In Salop the baby born to a tuberculous mother is sent at once to the county home for ailing babies, where it is kept under open-air conditions for a year. Meanwhile the mother completes her sanatorium treatment. At the end of the year the parents are persuaded if possible to send the child to relatives or to a public assistance institution. The system, however, is deemed unlikely to find much favour in this country. The re-housing of tuberculous families is also receiving attention. Insufficient discrimination seems to be exercised in the selection of intermediate stage adult patients for prolonged *sanatorium treatment*, while *many children* are labelled tuberculous on insufficient evidence. The Committee on Local Expenditure calculate that £60,000 to £80,000 a year might be saved if attention were given to selection and diagnosis. The machinery for exercising wise economy of the taxpayers' money has already been set up by the Ministry, and the recommendations of the Committee deserve the careful attention of local authorities.

There were 188 venereal disease treatment centres at the end of the year, varying in size from one which dealt with 4 cases to another which had nearly 10,000. There are strong grounds for believing that the centres deal with the great majority of the new syphilitic infections, and the figures, which show a decrease in new cases, may represent a genuine decrease in the incidence of syphilis, as relatively few sufferers nowadays can afford private treatment. Patients tend more and more to apply for treatment in the primary stage, at a time when the disease can be eradicated at much less cost and with much less danger to others. Cases of congenital syphilis seem to be too often neglected until the child reaches school age or serious disabling consequences have supervened. More coöperation between the venereal and school medical and child welfare services is needed. Too many syphilitic women attend for treatment during pregnancy and then, having an apparently healthy child, are seen no more.

Gonorrhœa shows little decline, and the report emphasises again the importance of having every kind of vaginal discharge examined as soon as possible. Far too few infected women seek treatment, and far too many cease attendance before completion of treatment. Education of the public in venereal disease problems is still urgently required.

NUTRITION

As fresh knowledge accumulates about nutrition the complexity of the subject becomes increasingly apparent. Healthy and complete nutrition is something infinitely wider than the mere stoking of an engine; it requires a healthy body; it is part of the sum total of sound physiological being. Nutrition, like malnutrition, is a process, not a state. Nevertheless, at the present time, scientific knowledge stands far ahead of practice, and the national capacity for work and output is impaired by unsatisfactory nutrition. The adequate nourishment of the child is one of the primary functions of the home; the appropriate nutrition of the adult is largely a matter of the common sense of the well-informed individual.

A diagram in the report shows that the adulteration of food has been steadily reduced, but this only deals with cases which can be brought to court; there has grown up at the same time a custom known as sophistication. Every firm now employs a chemist, and every sort of artifice is being used to improve the appearance, colour, taste, and keeping qualities of food. Many of the methods used are open to serious question; they seem capable of gradually affecting the digestive and metabolic functions and becoming a contributory cause of lowered vitality, impaired physique, debased nutrition, or indifferent health. It is hard for the physiologist to say what will be the ultimate effect of exposing foodstuffs to ultra-violet rays or insecticide gases, of adding vitamins or of introducing synthetic colourings and flavours. Food may be so treated as to give a totally false impression of its nutritive value. Stored butter can be made to appear fresh by adding diacetyl which may have some destructive effect on the A-vitamin; bleaching of flour may involve the destruction of carotene; "egg-powder" may contain no egg whatsoever, though suggesting artificially the rich yellow colour which carotene gives to the natural yolk. Bread is a highly unsuitable vehicle for vitamin D, but bakers may soon be adding irradiated ergosterol to their product so universally that it would be impossible to obtain plain bread. The report foresees a real danger from the uncontrolled "scientific" sophistication of food.

The importance of milk can hardly be over-estimated, and in some ways there has been steady and even remarkable advance. The ordinary milk-supply has been enormously improved in a generation, although the problem of tuberculosis remains unsolved. Not less than 40 per cent. of milch cows are more or less infected, and 1 to 2 per cent. of them yield tuberculous milk. The general average of tuberculous milk in towns is about 7 per cent. The incidence of tubercle among cattle can be reduced, but not eradicated, by such measures as slaughter and testing. The report regards pasteurisation as the one prompt and safe method of protection. In London about 90 per cent. of the milk is pasteurised already, and the experience of the trade does not show that pasteurisation leads to neglect of sound dairying; it is not safeguarding dirty milk but ensuring the safety and keeping power of good milk.

Tuberculosis in Wales

Since the early days of the collection of national statistics, Wales, in company with England and Scotland, has experienced a nearly unbroken fall in its death-rate from tuberculosis. This observation, so satisfactory to the public health and social worker, is based, it will be observed, upon an average, the average death-rate in the principality, and like all averages it conceals the equally important variation beneath. Study of this variation quickly reveals a less satisfactory position. For instance, in the years 1926–30 the average crude death-rate from respiratory tuberculosis in England and Wales was 789 per million; in the counties of Cardigan and Caernarvon it was, for the same period, 1224 per million, or half as high again as the rate for the whole country. By further analysis it may be shown that this excessive rate of mortality is still further concentrated upon particular areas. For example, in the rural district of Gwyrfai (Caernarvon) during the ten years 1921–30 there were 571 deaths from tuberculosis, or 2450 per million of its small population (roughly 24,000); in the urban district of Pwllheli there were 64 deaths from tuberculosis, or a rate of 1720 per million. Such enormously high rates, two and a half to three times the normal, obviously demand investigation from the point of view of the epidemiology of the disease as well as from that of prevention.

The results of a study of some of these "black spots" has recently been made by Dr. Herbert Chalke for the Welsh National Memorial Association.[1] His account of a few selected areas, including the rural district of Gwyrfai—and in detail two of its villages—does not make very encouraging reading. For instance, of Gwyrfai he says that the district is mountainous with a heavy rainfall and much mist and damp; the housing conditions are, in general, inferior to those usually met with in an industrial district—many houses have no through-ventilation (although there can be no question of a lack of space), are built on low-lying, damp land so that damp walls are common, and have the most primitive sanitary arrangements—in more than one village "fields, waste ground near the houses, and the banks of a stream were often used for dumping the waste matter"; many would be condemned as unfit if alternative accommodation were available. Observation and inquiry led Dr. Chalke to the conclusion that the diet, although usually sufficient in quantity, is often improper. Tea is consumed to great excess, fresh meat and green vegetables are lacking—in a rural area, where ample land is available, few of the houses have cultivated kitchen-gardens. The habits and customs of the people (in conjunction with the heavy rainfall) favour close contact in small living rooms and poorly ventilated vestries which provide many opportunities for the spread of infection. Intemperance is absent, but there is a lack of opportunity for suitable recreation in the open air, and intermarriage is common, which, Dr. Chalke says, ensures that the bedridden phthisical patient does not suffer from a lack of visits from his numerous relatives!

There is, therefore, no dearth of factors which may, each and all, be implicated as contributing to the phthisis incidence. To measure their relative importance is not an easy task. It would not be difficult to find English—and perhaps Welsh—villages whose inhabitants intermarry, live in inferior and insanitary houses, eat an unbalanced diet, and yet do *not* suffer from an abnormally high phthisis death-rate. This careful study suggests many practical measures which should be taken to improve the health of the population of the area; it can hardly be said to solve the epidemiological problem involved. A number of the observations reported certainly demand somewhat more consideration than has been given to them and some statistical evidence in their support. For instance it is stated that many females migrate "both to the towns of Caernarvonshire and to urban areas further afield where they seek employment as domestic servants, shop assistants, and nurses." This factor may well have an important effect upon the phthisis-rate of the young adults in the rural area. It is an old observation that the rural death-rates from phthisis at young adult ages often exceed the urban death-rates at the same ages. Migration is, with little doubt, the important factor, but two interpretations of its modus operandi are possible: (1) the young migrants contract phthisis in the urban environment and return home to die; (2) the young migrants are the "cream" of the rural population, physically and mentally, and the accession of such a select group lowers the death-rates in the towns while their departure leaves a subnormal group in the country districts, whose higher death-rate is not surprising. Perhaps both factors are normally operative. A laborious investigation of the point was made by Mr. A. Bradford Hill, D.Sc., for the Medical Research Council some years ago in the County of Essex,[2] the conclusion being in favour of the second hypothesis—that the migrants not only were physically select, but mainly retained their superior health in the urban environment and did not return home to die of disease contracted in the town. Dr. Chalke, on the other hand, reports that " many of the females, who are of the young adult class, come from homes heavily infected with tuberculosis, and it is only too common for these girls to break down under the strain of town life. They return home with active tuberculosis. Particulars of numerous cases of this nature have been obtained." Perhaps this is true only of a limited area; certainly in recent years enormous numbers of Welsh girls, from all parts, have migrated to urban areas, so that the point is an important one. The effect of urban life upon their health needs far more careful inquiry than Dr. Chalke has been able to devote to it. His opinion is not that they contract tubercle in the towns, but coming from infected homes they break down under the changed conditions and the strain of occupation and the quiescent disease flares up.

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[1] Report of an Investigation into the Causes of the Continued High Death-rate from Tuberculosis in certain parts of North Wales. 1933. Pp. 103. From the offices of the Association, Westgate-street, Cardiff.

[2] Med. Res. Council, Special Report Series No. 95, 1925.

A problem of prevention which he rightly stresses with regard to the non-migrating population is the attitude of the people themselves, a fatalistic outlook and an inherent pride being common traits. He points out that those tend towards concealment of the disease and put many obstacles in the path of those engaged in the antituberculosis campaign. Even to-day, examination by the tuberculosis officer is often refused, because his visit is believed to stigmatise the family. Thus the large number of cases which are, for these reasons, undetected and uncontrolled, form an ever-present storehouse from which infection emanates. Although few of the houses have facilities for the satisfactory isolation of consumptives, the number of patients who refuse the offer of institutional treatment is large. Intermarriage, as already pointed out, may increase these risks of infection. From the inheritance aspect, however, selected genealogical tables, from villages where but a few unrelated families exist, cannot be informative. Another factor of importance in the area is the occupational one. A large number of males are employed in various branches of slate-quarrying, and may be exposed to a silica risk. Dr. Chalke believes that this factor undoubtedly plays some part in maintaining the high phthisis death-rate, but that only more detailed evidence can determine whether it is an important part.

In his recommendations he stresses as by far the most essential the hygienic education and drilling of the patient and the family to prevent the dissemination and more particularly the direct transmission of tubercle bacilli. The replacing of defective cottages by modern houses will, no doubt, be a slow process, and the reform in the dietetic habits of the people still slower. Meanwhile, this report shows, there are no lack of problems to occupy the attention of the public health worker, although in considering such small areas the statistical basis is often too slender and the numerous factors too inter-correlated to allow definite conclusions to be reached with regard to causation, or to the relative importance of the factors incriminated.

Accommodation in Mental Hospitals

Almost all the reports received from public mental hospitals refer to the overcrowding of these institutions. In some cases patients from districts more than 100 miles away are received into already almost fully occupied hospitals. On purely humane grounds such transfers are to be deprecated; but even where no such arrangements exist many hospitals are too full. The admission-rate has been steadily rising since 1919, and though the last rise (despite the Mental Treatment Act and unemployment) is less large, it gives cause for considerable alarm from an administrative point of view. Fortunately intestinal infections and tuberculosis do not appear to be closely related to over-population, but influenza epidemics seem more prevalent in the worst crowded hospitals. The figures for Leicester City are typical. Whereas in 1922 the asylum population represented 1 : 353 of the borough population, in 1932 this figure rose to 1 : 279. In order to stave off this increasing demand upon beds the Lancashire county council decided, in 1931, to accommodate only certified cases. The policy has fortunately been reversed, and now 5 per cent. of the beds are available for voluntary patients. This figure is more generous than might appear, for the voluntary population is a more mobile one than the certified. A similar concern for accommodation is probably prompting the other authorities in whose areas few voluntary patients are received. The main cause for the increase in admissions is not clear. It is due in part to earlier willingness to transfer the mentally afflicted to suitable care, and less readiness to cope with him throughout the attack. But social conditions such as unemployment show little relation between their prevalence and their agency as a cause of mental disturbance.

There would seem to be a greater delay in the discharge of patients, a delay all to the good of the patient and to his home folk. Protests are sometimes made by individual members of the hospital committees, who say that the families of recovered or recovering patients are less willing to receive them owing to the risks of unemployment. Such statements are seldom well supported, but they contain probably a germ of truth.

In order to reduce the overcrowding many of the mental hospitals for 1932 mention new blocks opened or being erected, and the transfer of nurses from unsatisfactory old quarters in the main buildings to a new nurses' home, or the enlargement of one already existing. At West Sussex hospital, for example, a larger block for chronic patients, a villa for private patients, and an admission hospital have all been completed and occupied within 14 months. In addition a nurses' home has been built, and during the influenza epidemic the proportion of cases in the new home was less than amongst nurses living in the old building. The medical superintendent of the Cumberland and Westmorland hospital implores his committee for a new admission block, and pertinently compares the sums spent on the care of the insane with those spent on the care of the roads. In Cheshire the board of control have blessed an ambitious scheme for the building of an admission block and villas for 500 patients.

Similar expenditure on colonies for the mentally defective indirectly relieves the overcrowding of the older hospital; 100 such patients have recently been transferred from the Hertfordshire hospital, and in other areas similar but smaller changes are contemplated. The transfer of senile and quiet cases to the public assistance institutions is reported from several counties. One side of these proposals must not be overlooked in the anxiety to lighten mental hospital population, and that is the training of the mental nurse. Some of these transferred cases present senile physical disabilities that have afforded valuable general nursing experience.

Finally the boarding out of the mentally dull is a method used too little for lack of available information about homes where such patients can be taken. Extension of this practice is desirable to familiarise the public with it, and to remove the misconception that a mental hospital is a prison in which the insane are kept for life.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 9TH, 1933

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 2 (last week 4); scarlet fever, 2370; diphtheria, 878; enteric fever, 60; acute pneumonia (primary or influenzal), 412; puerperal fever, 39; puerperal pyrexia, 122; cerebro-spinal fever, 17; acute poliomyelitis, 35; acute polio-encephalitis, 2; encephalitis lethargica, 7; dysentery, 25; ophthalmia neonatorum, 95. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Sept. 12th–13th was as follows: Small-pox, 13 under treatment, 0 under observation (last week 15 and 0 respectively); scarlet fever, 1747; diphtheria, 1460; enteric fever, 13; measles, 440; whooping-cough, 275; puerperal fever, 23 mothers (plus 11 babies); encephalitis lethargica, 253; poliomyelitis, 4; "other diseases," 177. At St. Margaret's Hospital there were 18 babies (plus 11 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 1 (1) from enteric fever, 4 (1) from measles, 7 (1) from scarlet fever, 13 (1) from whooping-cough, 19 (5) from diphtheria, 103 (17) from diarrhœa and enteritis under two years, and 12 (1) from influenza. The figures in parentheses are those for London itself.

Of the deaths from diarrhœa outside London, 17 were reported from Liverpool, 7 from Birmingham, 6 from Sunderland, 4 each from Portsmouth, Bristol, and Leicester, 3 each from Acton, Leeds, Nottingham, and Stoke-on-Trent. Birmingham reported 3 deaths from whooping-cough. Five deaths from diphtheria occurred at Liverpool, 3 at Leeds.

The number of stillbirths notified during the week was 249 (corresponding to a rate of 39 per 1000 total births), including 48 in London.

SPECIAL ARTICLES

PROBLEMS OF MEDICAL PRACTICE IN AMERICA

(BY A SPECIAL CORRESPONDENT)

III.*

THE Committee on the Costs of Medical Care were unable to present a unanimous report, which is not surprising in view of the size of the Committee and the variety of the interests represented upon it. At the time of reporting (October, 1932) the Committee had 48 members; nine members signed a minority report, which may be taken as expressing the views of the American Medical Association; there is a second minority report signed by two of the dental members of the Committee, and there are two individual statements of dissent. Moreover, there is some divergence of opinion among the signatories of the majority report and the main minority report: eight of the former and two of the latter declare themselves in favour of compulsory health insurance, although the recommendations of both reports are against it.

THE MAJORITY REPORT

The majority report is based on two conclusions reached by the Committee from the evidence collected by them: (1) that many persons do not receive the medical care they need, or receive it at rates which for them are excessive; (2) that many persons who give the care receive inadequate remuneration. The majority see the remedy in the organisation of both "producers and consumers." They recommend that the persons giving medical care should be so organised that the medical unit should not be an individual practitioner, but a group of practitioners, and that the persons receiving medical care should voluntarily form groups uniting to make periodical payments into a common fund, from which the costs of any treatment required by a member of a group would be defrayed. In other words, the remedy of the majority is group practice and voluntary health insurance.

GROUP PRACTICE.—Dealing first with the organisation of medical services, the majority recommend as the "keystone of the concept of a satisfactory medical service for the nation" the development in cities of not less than 15,000 population of one or more non-profit "community medical centres":

> "This centre would include a well-equipped general hospital, an out-patient department, and a pharmacy. It would provide offices for physicians, dentists, technicians, and subsidiary personnel, and headquarters for nurses. All facilities for the practice of modern scientific medicine would be available, such as X ray, laboratory and physiotherapy equipment, and a well-stocked library."

The centre would be under the administrative control of a lay board, similar to a voluntary hospital board, but the professional aspects of the service would be controlled by the professional personnel through an executive committee or chief officer. The patients would be given free choice of doctor, and "the rôle of the family practitioner would be prominent and respected." It is contemplated that nearly all the practising doctors and dentists in the areas served would eventually join the staff of a centre, and would be paid by the centre on an agreed basis, salary, capitation, or fee. The distinctive feature of such practice would be that each practitioner would be responsible to the group rather than to himself for the quality of his work. In towns too small to support a complete centre smaller units affiliated to the nearest centre would be established; and in the villages and rural areas, which contain about 38 per cent. of the population of the United States, there would be a series of "medical stations," each staffed by one or two doctors, a dentist, and a few public health nurses or nurse-midwives. The stations would be affiliated to centres, and would occasionally be visited by travelling specialists.

The majority contemplate also the continuance for some time of complete medical services provided jointly by employers and employees for the workers in an industrial undertaking or group of undertakings. They think such a service "embodies a desirable form of organisation for medical care if it is developed so that the participating professional men have control over the professional aspects of the service and opportunity and stimulus to maintain high standards," but they would prefer that eventually all industrial medical services should expand into community medical centres. They contemplate also the extension of the health services which some American universities now provide for their students, and they attach special importance to the development of the public health services, central and local. The sum of $1 per head that the people of the United States now spend on public health services should, the majority think, be increased to $2 or $3 per head. They recommend that the work of the various centres and other agencies concerned with the provision of medical care should be coördinated by appropriate local and central bodies.

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* Parts I. and II. appeared in THE LANCET of Sept. 9th and 16th respectively.

It will be seen that the recommendations of the majority report would bring about drastic alterations in the conditions of medical practice. Independent practice would for nearly all practitioners become a thing of the past. With a few exceptions the doctor would be the appointed member of a staff responsible to a professional chief. This would involve changes in practice far more important in their direct and indirect effects than those brought about in this country by the national health insurance scheme.

GROUP PAYMENT.—The majority recommend that the costs of medical care should be met by the use of voluntary insurance, aided where necessary by subsidies from taxation, which should not include the provision of cash benefits. They recommend that organised groups of consumers should pay agreed annual sums in weekly or monthly instalments into a common fund, and arrange with organised groups of practitioners to furnish the members of the groups and their families with complete medical care, which it is thought could be provided for about $1.50 to $3.25 per month per member, with rather lower rates for dependents. It is recognised that some persons would be unable to pay the full costs, and that the taxpayer may have to be called upon to supplement the payments of the low-income families. In sparsely populated areas or in those of exceptional poverty the local authorities should, it is recommended, employ salaried doctors to furnish general medical services to the residents of the area.

THE MINORITY REPORTS

The first minority report, which is signed by seven of the 17 private practitioners on the Committee, and by the president of the Catholic Hospital Association and the secretary of the American Medical Association, is in agreement with the recommendations of the majority with respect to the development of public health and medical education, but on the main recommendations—those relating to group practice and group payment—there is a fundamental difference of opinion. The minority feel strongly that the individual practitioner and not the group should be the unit in medical practice. The medical centre plan of the majority they regard as "the adoption by medicine of the technique of big business, that is, mass production," a technique that cannot be applied in dealing with problems so intensely personal and individual as those of medical diagnosis and treatment. They hold that in a group the general practitioner tends to disappear, and they think the general practitioner should take a place of paramount importance in medical practice. "The great majority of illnesses and injuries (about 85 per cent.) are of such a nature that they can be treated efficiently by any able general practitioner with very simple equipment." The minority contend that the medical centre would, besides impairing the position of the general practitioner, establish in every community a medical hierarchy which could dictate who might practise there; competition between the various centres would arise with unfortunate results on the quality of the service, and the continuous personal relation between doctor and patient could not be maintained. As for the staff of the centre, freedom of action, except for the heads of the group, would be "restricted in respect to vacation, study, travel, attendance upon scientific meetings, and even publication of medical articles, by the will of the chief or chiefs of the clinic." Industrial medical service the minority regard as still more objectionable, since it involves contract practice; and contract practice the minority think tends to degrade the medical profession by lowering its ethical standards and by encouraging unfair competition, inadequate remuneration of the doctors, and inferior medical service. For these reasons the minority are against the group payment, or voluntary insurance proposals of the majority. They think that if America must adopt a system of insurance it would be more sensible and logical to choose "the method to which European countries have come through experience, that is, a compulsory plan under governmental control." They are, however, opposed to any form of health insurance except under the restrictive conditions set out in the next paragraph.

The minority regard the main problem considered by the Committee as one of a number of general problems arising in a transitional stage of social development marked by increasing urbanisation and industrialisation and by radical changes in the standard of living—problems analogous to those "which caused great social and political unrest in the last decade of the last century and which were not settled until there was a general increase in wages to compensate for improvements in the standard of living." It seems a fair inference from their report that the minority think that with the return of prosperity existing methods of providing medical care will, with minor modifications, suffice for the general body of the community. But they feel strongly that the Government ought to give complete medical care to the indigent, who, they say, at the present time receive their care largely at the cost of the medical profession. They recognise also that for numbers of the poor who are not indigent some insurance method may be necessary, especially for the treatment of chronic illnesses, but they recommend that any method that may be adopted should fulfil the following conditions:—

"1. It must be under the control of the medical profession. (A 'grievance board' to settle disputes, having lay representation, is permissible and desirable.)

2. It must guarantee not only nominal but actual free choice of physician.

3. It must include all, or a large majority of the members of the county medical society.

4. The funds must be administered on a non-profit basis.

5. It should provide for direct payment by the patient of a certain minimum amount, the common fund providing only that portion beyond the patient's means.

6. It should make adequate provision for community care of the indigent.

7. It must be entirely separate from any plan providing for cash benefits.

8. It must not require certification of disability by the physician treating the disease or injury."

The minority think that the county medical society is the proper unit of organisation to carry out such a plan, under the supervision of the State and national societies.

There is a second minority report, of four pages only, signed by two of the dental members of the Committee, which is in accord with the general recommendations of the majority in favour of group practice and group payment, but agrees with the minority in regarding the medical centre plan as utopian and involving many details too visionary and problematical to justify inclusion amongst the Committee's recommendations. They regret that the Committee's inquiries did not include a study of dental group practice, which they find is increasing in America, and they think a trial should be given to compulsory health insurance, which need not, in their view, "interfere with the highest professional standards nor with the close personal relationship between practitioner and patient." They are in sympathy with the county medical society plan of health insurance formulated by the minority, and conclude by suggesting that a national organisation should be formed to study group practice and define its standards.

It will be noted that the second minority report is favourable to the introduction of compulsory health insurance into America, but the signatories of the other reports are opposed to it, though, as already pointed out, they are not unanimous in that view. It does not seem, however, that the Committee have made an adequate study of the various methods of health insurance adopted in Europe. There is nothing to show they were aware of the tendency in compulsory health insurance to separate the cash benefit side from the provision of medical services, and that in several European countries, including Great Britain, the insurance societies have no concern with the administration of medical benefit; and the signatories of the minority report appear not to appreciate that in France and Norway medical care is provided for the insured population under conditions similar in many respects to those they recommend for adoption in any development of health insurance that may be necessary in America.

THE VALUE OF THE COMMITTEE'S WORK

To a European student of the majority and minority reports and the documents on which they are based, the chief value of the Committee's output lies in the wealth of facts collected on the conditions of medical practice in America, and in the clear presentation of the important issues arising from consideration of the facts. On the constructive side both reports are disappointing, regarded as the results of five years' intensive study by so distinguished a body of workers. As to the majority report, many European readers will be inclined to share the view expressed by Mr. Edgar Sydenstricker in his short statement of dissent that the recommendations do not "deal adequately with the fundamental economic question which the Committee was formed primarily to study and consider." The facts presented by the Committee show that the question presses urgently for solution, calling for measures that could be made operative in the near future. But the majority put forward a scheme which they contemplate will require some 25 years for fulfilment. The minority's solution seems still more inadequate. They appear to regard the problem of making proper provision for medical care as one which tends in large measure to solve itself; at all events, their summary dismissal of it on page 182 of the report suggests that they are content, in words used by Mr. Dooley in connexion with another important problem, to "turn the job over to Destiny."

The Committee on the Costs of Medical Care have, however, performed a service of great importance both to the medical profession and to the public by their clear setting out of certain questions upon the answers to which the position of the profession in a modern community will depend. Of these the most important is whether medical practice should be carried on by individual independent practitioners or by groups of practitioners responsible to a superior authority. Beside this the related question whether medical services should or should not be paid for on an insurance basis is of secondary consequence. The Committee's researches have thrown a flood of light on these questions, and their reports deserve to be widely read and carefully considered.

PARIS

(FROM OUR OWN CORRESPONDENT)

THE LATE PROF. HAYEM

THE death of Georges Hayem removes a familiar landmark in French medicine. He was one of the most prominent personalities in the Academy of Medicine, to whose discussions he often contributed the saving grace of a mature intellect. He was born in Paris in 1841, and his professorial career began while he was still comparatively young. In 1879 he held a chair of therapeutics. Later he was professor of clinical medicine at Saint-Antoine, where his ninetieth anniversary was recently celebrated. He became a member of the Academy of Medicine in 1886, and was elected its president in 1918. The range of his scientific attainments was wide; the association of his name with diseases of the stomach and blood reflected only two of many interests. He combined the acumen of the successful clinician with the precision of the laboratory worker, and in both fields he has left his mark.

THE INDISPENSABILITY OF THE SANATORIUM

The sanatorium has of late been the subject of much inexpert criticism here as in other countries. It is true that the latest sanatoriums have cost a pot of money. It is also true that in tuberculosis the greatest therapeutic advances made in the last generation have been surgical. But neither of these considerations nor any of the other quasi-plausible objections to the sanatorium would seem to justify its sabotage in the campaign against tuberculosis. A recent discussion in the Academy of Medicine have done much to quash the anti-sanatorium agitation. Those who contributed to the discussion were acknowledged leaders in the medical profession, and the unanimity shown on the subject was striking. The only criticism voiced was one of detail rather than principle. It was urged that in trying to save their patients' lungs sanatorium physicians were apt to ignore their digestive tracts. This only by the way. The ball was started rolling by no less an authority than Émile Sergent. It was taken up in succession by Léon Bernard, Bezançon, Paul le Gendre, and Rist. As Sergent pointed out, it was as lately as 1919 that the Honnorat law imposed on every department the obligation of providing a public sanatorium. Since then the belief has taken root that the sanatorium is but a legend, a souvenir, a myth, an antiquated conception to be abandoned. But he was sure the achievements of modern surgical technique would often be illusory were it not for the supplementary aid of sanatorium treatment. Bernard spoke in the same sense, deprecating the tendency in certain high quarters to place faith in the cheap short cut to recovery. Le Gendre focused attention on the educational rôle played by the sanatorium, which not only turns out patients taught to prevent the infection of others, but also physicians schooled in the psychological requirements of the patient, as well as in the modern technique of collapse and other therapy. Rist, in his turn, emphasised the value of the sanatorium as a much needed bulwark against the quack. In France his name is legion. He assures the patient that he can be cured without taking rest, without ceasing work, and while still making money. The quack is to be met by facilitating the entry of the patient to a sanatorium with the minimum of delay.

"WE SHALL END IN PRISON"

A provincial surgeon, in a letter to the *Concours Médical*, gives chapter and verse in support of the rather dismal prognostication with which he heads his communication, "Nous finirons . . . en prison." Not only do his patients refuse to pay his fees but they seem to revel in bringing actions against him for malpractice and other lapses from what they consider nice behaviour. In March last year a woman asked to be confined in this surgeon's clinic. She had no means nor social position, and he undertook to admit her only after her "protector" had undertaken in writing to pay her hospital and operation expenses. When, a year later, the matter came into court the surgeon lost his case because the name of his clinic had not been specifically mentioned. Three years ago this same surgeon operated in her home on a woman for retention of a dead fœtus. She returned to work a few days later. After four months a severe hæmorrhage occurred, and she was admitted to a hospital where she was curetted. It was intimated to her by the operator that if she had been in danger it must have been because the original operation had been incomplete. The woman not only refused to pay the surgeon's fee but was also prepared to sue him for damages. She was bristling with affidavits. The surgeon decided that discretion was the better part of valour, and the affidavits were exchanged for a receipted bill. On a third occasion this same surgeon attended at his clinic the victim of a road accident. The main blood-vessels of the injured leg being intact he tried to save it. Unfortunately, two days later, signs of infection having developed, he had to amputate it. Two years later the conical stump was operated on by another surgeon who commented unfavourably on its genesis to the patient, who not only refused to pay his first surgeon's fees but is now suing him for 150,000 francs. The provincial surgeon who recounts these misadventures states that the medical profession seems to be the subject of a more or less latent hostility on the part of legal authorities, and he traces this attitude back to student days, with the ranks of the medical student recruited for the most part from the have-nots and the law students from the well-to-do. In an editorial note on this letter it is pointed out that in 90 per cent. of the actions brought against medical practitioners the careless and often uncharitable remarks of another doctor constitute the basis of the action.

MEDICINE VERSUS ALCOHOL

The revenue derived from alcohol in France is considerable. So is the antagonism of the medical profession to it. Recently the authorities decided to license 2000 new public houses (*débits de boissons spiritueuses*). Whatever the reasons for this step the medical profession, as represented by the Academy of Medicine, has been prompt in trying to arrest it. At a meeting of the Academy a resolution was unanimously adopted protesting vigorously against this step. Only a few months earlier the Academy was the scene of a similar protest, this time against propaganda in favour of alcoholic beverages in school primers.

CENTENARY OF A BENEVOLENT SOCIETY

Recently the Association des Médecins de la Seine celebrated its centenary in the large amphitheatre of the faculty of medicine in the presence of the President of the French Republic. The founder of this body was a Spaniard, Dr. Orfila, who became a naturalised Frenchman. He was the doyen of the faculty of medicine in 1833, when he founded the Association and became its first president. He held this position till his death in 1853, although in the interval his political views had led to his persecution by the authorities. Many distinguished members of the medical profession have subsequently presided over the activities of this Association, which began with a capital of 7000 francs and now disposes of more than four million francs. The interest from this sum is devoted to aiding destitute members of the medical profession and their families.

IRELAND

(FROM OUR OWN CORRESPONDENT)

THE HOSPITALS SWEEPSTAKES

Lord Powerscourt, Chairman of the Associated Hospitals Committees had important interviews lately with Mr. De Valera and with Dr. C. Ward, Parliamentary Secretary to the Department of Local Government and Public Health, concerning the intentions of the Government with regard to the sweepstakes. Dr. Ward assured Lord Powerscourt that the Hospitals Commission would be set up immediately, and that it would investigate all claims and report as soon as possible. It was the aim of the Government to establish a system whereby waste and overlapping of work would be reduced, and a well-thought-out scheme of coördination introduced. The Government wished to obtain the maximum of free beds for the sick poor. It was not intended to delay the distribution of the funds longer than was necessary to attain these objects. The Government has invited the five gentlemen who have hitherto acted as trustees for the sweepstakes funds to act as National Trustees. They are: the Earl of Granard, Lord Holmpatrick, the Right Hon. T. K. Laidlaw, Mr. Edmond McGrath, and Mr. H. Monahan.

THE LATE DR. E. T. BLAKENEY

Edmond Thomas Blakeney died recently in Dublin at an advanced age. Born in County Roscommon, he took the licences of the Royal Colleges of Dublin in 1869. Having practised for some years as dispensary doctor at Boyle in his native county, he was appointed surgeon to the Roscommon County Infirmary, and he fulfilled the duties of that office for 46 years until his retirement a few years ago. Working in a lonely district, far from any scientific centre, Blakeney kept in touch with modern surgery to a surprising degree. He was one of the first surgeons in Ireland to realise the practical uses of X rays, and even up to the date of his retirement he performed the most modern operations. He was held in great respect both by the public and by his professional brethren through the province of Connaught. Although in busy surgical practice, Dr. Blakeney found time to take part in the sport of the county, and was for several years master of the Roscommon Harriers.

THE PREVENTIVE ASPECT OF DISEASE

COURSE AT KING'S COLLEGE HOSPITAL

A COURSE of medical lectures, emphasising the preventive aspect of disease, will be given at King's College Hospital medical school at 4.30 P.M. on Thursdays during the coming session. This innovation is welcome in view of the wide ground covered by the syllabus (set out below), and the careful choice of exponents of each aspect of preventive medicine. It is of interest that of the lecturers eight are past or present members of the staff of the hospital. Those invited from outside include the chief medical officer of the Ministry of Health and four of his colleagues at the Ministry or at the Board of Education, the senior medical officer of the Home Office, a medical coroner, and well-known teachers in other schools of the University of London.

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These lectures are free to all practitioners as well as to students of the hospital.

MEDICINE AND THE LAW

Herbalist and Registered Practitioner

AN inquest was held at Walthamstow last week upon the death of a 12-year-old girl who had been treated by a herbalist. The latter, Prof. G. C. Foster, of Forest-road, Walthamstow, gave evidence of having prescribed for a cold. Later, thinking the patient was in an extreme state of debility and possibly of exhaustion, he advised the parents to call in a registered medical practitioner. Though Prof. Foster repudiated the suggestion, the coroner seems to have taken the view that the advice to the parents was due to a desire to obtain the services of someone who could sign a death certificate. The coroner observed that unregistered practitioners who treat a patient until life is in danger and then bring in a registered practitioner for the purpose of getting over the difficulty of death certification are infringing the spirit of the Medical Acts. As, however, the Acts enable unregistered persons to practise, it is hard to see how their spirit was in this case infringed. Another point which sometimes arouses comment is the use of the title or description "Professor." The word ordinarily suggests the occupancy of an academic chair at some accepted university or college. Prof. Foster may have this qualification, but other unregistered persons undoubtedly adopt the title, to the confusion of the public, with insufficient justification. The Medical Act, which forbids the unauthorised use of such titles as "physician" and "surgeon," has of course no concern with the title of "professor." The sponsors of the proposed legislation against spurious university degrees will perhaps consider whether their Bill might not be extended to cover non-existent professorships.

At the Walthamstow inquest Dr. O'Kelly described the result of his post-mortem examination of the dead child. Death was due to pericarditis and blood poisoning. He found nothing to justify the view that anything more might have been done for the child. The coroner recorded a verdict in accordance with the medical evidence.

PANEL AND CONTRACT PRACTICE

The Unemployed Person and his Friends

THE annual conference of representatives of local medical and panel committees, which is to meet at B.M.A. House on Thursday, Oct. 19th, will no doubt discuss the prolongation of insurance for unemployed persons. The reply of the Government to a deputation from the Insurance Acts Committee was that the law could not be held to justify putting pressure on local authorities to substitute a panel system for the present system of medical relief. The Ministry were prepared to agree to the introduction of the open-choice method in cases where the authority itself wished to make the change. They were not disposed however to create a limited privileged class amongst those entitled to medical relief, the capitation payment for whom could not be placed on insurance funds, and the present situation precluded the possibility of throwing the charge on the Exchequer. In this matter there seems to be a difference of opinion between insurance committees and approved societies. A pamphlet by the Federated Association of Insurance Committees for England, Scotland, and Wales sets out the arguments for the continuation of these unemployed persons in medical benefit. The Association point out the anomalous situation created by allowing re-entry into insurance only after eight weeks' employment in any half year, whereas persons other than this particular class become entitled to medical benefit on payment of their first contribution on entry or re-entry into insured employment. They estimate the number of insured persons who will go out of insurance at the end of 1933 as likely to exceed 100,000; to hand over to poor-law medical officers the treatment of this mass of able-bodied unemployed persons is not, they feel, in accord with the public policy which dictated the Local Government Act of 1929. To continue these (100,000) people in medical benefit at (say) 12*s.* a head would cost £60,000. To find this money four methods are suggested :—

1. The Government, by cutting down their contributions to benefits from two-ninths to one-seventh in the case of insured men, and to one-fifth in the case of insured women, has saved some £2,800,000 a year; and a further £800,000 mostly from the 10 per cent. deduction from the doctors' capitation fees. There should be no difficulty therefore in finding £60,000.

2. A small adjustment of the central fund, or alternatively a postponement in the redemption of reserve values, might enable insurance funds to meet the cost.
3. Public assistance authorities might be invited by the Minister to make a contribution to meet the cost. This being a national rather than a local matter, treasury grants to the authorities might be augmented if this suggestion were adopted.
4. Some combination of these methods.

In one way or another the Association insist that the maintenance of these persons in the insurance scheme should be definitely secured, a policy held to be in harmony with public sentiment, which is opposed to the transference of sick persons to the poor-law medical service just because they are unemployed. On the other side is Sir Thomas Neill, who in another memorandum seeks to show that no one who does not contribute can share in an insurance scheme. But although the funds of approved societies may be dangerously low, the officials generally do not strongly support Sir Thomas.

We might point out that there are three sources from which the money comes: Government, employer, and employee. The approved societies seem apt to forget the first two, and especially the fact that it is the reduction of the Government contributions that has made the position of some societies so precarious. The employer's contribution has not been reduced. But when through no fault of his own the employee is no longer able to work, his approved society—his natural protector—begs the Government to turn him out, hand him over to the poor-law, and thus get rid of an unprofitable member. Insurance committees have more consideration, and it is to be hoped they will even now persuade the Ministry to adopt their suggestions.

Effect of Unemployment upon the Panel Doctor

Dr. Theodore Craig (Dudley, Northumberland) writes: "According to the statistics of the Ministry of Health, some 600,000 insured persons will cease benefit on Jan. 1st, 1934, but, judging from the increasing lapses from panel lists in Northumberland and Durham, the local panel committees consider that this number will exceed one million. All these people, and their dependants, probably numbering another three million, will then become chargeable to the various public assistance committees. So far as can be ascertained at present, the Government has made no arrangements for providing any additional funds to enable these committees to meet the cost of medical attendance upon them. To the casual eye this would seem an excellent chance for district medical officers to increase their practices and to grow wealthy at the public expense, but the salaries of these officers remain on the scale fixed in prosperous days, long before the war, when pauperism was almost unknown. In the county of Northumberland, for instance, careful statistics have been prepared by the M.O.H., which prove that the 'fee per service rendered' varies between 3 guineas and 1½*d.* In other words, district medical officers in areas where there is no 'distress' are adequately paid for such rare services as may be required, whereas D.M.O.'s in the really distressed areas are not.

"My own personal experience is that, prior to the general strike of 1926, my salary of £25 per annum as a D.M.O. actually produced a fee of nearly 2*s.* per service. Figures carefully kept for a period of over two years show that I have recently received rather less than threepence per service rendered. After the strike of 1926 I was asked by the local guardians to put in an account for extra work with a view to special consideration. I sent in an account, based on the minimum B.M.A. fees, which amounted to over £200. The guardians eventually sent me an ex-gratia cheque for £50. Since that time, I and many other D.M.O.'s have made numerous efforts to induce the public assistance committee to pay us a reasonable salary—i.e., something approaching 1*s.* 6*d.* per service rendered—but no reply has been received to our numerous letters. The county medical officer tells us frankly that no funds are available. What can we do?

"There is one other point which demands attention. When the insured person is compelled to seek medical attention for himself and his dependants from the D.M.O., he is, naturally, incensed at his own panel and family doctor, with the result that, should any members of the family still remain in insurance benefit, they wish to transfer their 'panel cards' to the D.M.O. This, very naturally, causes friction between the D.M.O. and his professional brethren, who accuse him of using his public appointment to feather his private nest. Hence the D.M.O. is liable to lose professional prestige. The only solution that I can see is to throw open the public assistance service to the general practitioner and allow every person free choice of doctor."

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Lt. J. H. Nicolson to be Surg. Lt.-Comdr.

The following appts. are notified: Surg. Comdrs. J. Wylie to *Norfolk*; T. Madill to Chatham Hospital; C. N. Ratcliffe to *Achilles*; and H. Hurst to *Exeter*. Surg. Lt.-Comdrs. G. S. Rutherford to *President*, addl., for Medical Depôt, Royal Victoria Yard, Deptford; and A. L. McDonnell to *Shoreham*. Surg. Lts. H. E. B. Curjel to *Kent*; and J. W. Caswell to *Sandwich*.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lt.-Comdrs. J. E. Purves to *Victory*, for Haslar Hosp.; E. E. D. Gray to *Malaya*; and K. A. Nicholson to *York*.

Surg. Lt. E. F. St. J. Lyburn is transferred to Sussex Division from Ulster Division.

ROYAL ARMY MEDICAL CORPS

Majs. T. B. Nicholls and J. B. Jones to be Lt.-Cols.

INDIAN MEDICAL SERVICE

Maj.-Gen. W. C. H. Forster, C.I.E., V.H.S., retires.

The prov. promotions of the undermentioned Majs. are confirmed: D. P. Bhargava and B. R. Tandon (on prob.).

Lt. (on prob.) B. A. Porritt to be Capt. (prov.) (on prob.).

ROYAL AIR FORCE

Flight Lt. L. P. McCullagh is promoted to the rank of Squadron Leader.

BROADCASTING TALKS.—On Friday, Oct. 6th, at 10.45 A.M., the first of a new autumn series of talks on child welfare will be broadcast. It is announced that they will be given by physicians who have made a special study of the needs and ailments of childhood. The first three, in October, will be devoted to antenatal clinics, and on Oct. 27th the first of several talks on diets will be given. A pamphlet has been prepared in connexion with these talks, which gives detailed advice on the planning of menus.

In the series entitled Some British Institutions, to be given on Wednesdays, at 7.30 P.M., on Nov. 15th, a medical officer in the public health service will describe some of the problems and difficulties of his work.

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MEDICINE AND THE LAW

Herbalist and Registered Practitioner

AN inquest was held at Walthamstow last week upon the death of a 12-year-old girl who had been treated by a herbalist. The latter, Prof. G. C. Foster, of Forest-road, Walthamstow, gave evidence of having prescribed for a cold. Later, thinking the patient was in an extreme state of debility and possibly of exhaustion, he advised the parents to call in a registered medical practitioner. Though Prof. Foster repudiated the suggestion, the coroner seems to have taken the view that the advice to the parents was due to a desire to obtain the services of someone who could sign a death certificate. The coroner observed that unregistered practitioners who treat a patient until life is in danger and then bring in a registered practitioner for the purpose of getting over the difficulty of death certification are infringing the spirit of the Medical Acts. As, however, the Acts enable unregistered persons to practise, it is hard to see how their spirit was in this case infringed. Another point which sometimes arouses comment is the use of the title or description "Professor." The word ordinarily suggests the occupancy of an academic chair at some accepted university or college. Prof. Foster may have this qualification, but other unregistered persons undoubtedly adopt the title, to the confusion of the public, with insufficient justification. The Medical Act, which forbids the unauthorised use of such titles as "physician" and "surgeon," has of course no concern with the title of "professor." The sponsors of the proposed legislation against spurious university degrees will perhaps consider whether their Bill might not be extended to cover non-existent professorships.

At the Walthamstow inquest Dr. O'Kelly described the result of his post-mortem examination of the dead child. Death was due to pericarditis and blood poisoning. He found nothing to justify the view that anything more might have been done for the child. The coroner recorded a verdict in accordance with the medical evidence.

PANEL AND CONTRACT PRACTICE

The Unemployed Person and his Friends

THE annual conference of representatives of local medical and panel committees, which is to meet at B.M.A. House on Thursday, Oct. 19th, will no doubt discuss the prolongation of insurance for unemployed persons. The reply of the Government to a deputation from the Insurance Acts Committee was that the law could not be held to justify putting pressure on local authorities to substitute a panel system for the present system of medical relief. The Ministry were prepared to agree to the introduction of the open-choice method in cases where the authority itself wished to make the change. They were not disposed however to create a limited privileged class amongst those entitled to medical relief, the capitation payment for whom could not be placed on insurance funds, and the present situation precluded the possibility of throwing the charge on the Exchequer. In this matter there seems to be a difference of opinion between insurance committees and approved societies. A pamphlet by the Federated Association of Insurance Committees for England, Scotland, and Wales sets out the arguments for the continuation of these unemployed persons in medical benefit. The Association point out the anomalous situation created by allowing re-entry into insurance only after eight weeks' employment in any half year, whereas persons other than this particular class become entitled to medical benefit on payment of their first contribution on entry or re-entry into insured employment. They estimate the number of insured persons who will go out of insurance at the end of 1933 as likely to exceed 100,000; to hand over to poor-law medical officers the treatment of this mass of able-bodied unemployed persons is not, they feel, in accord with the public policy which dictated the Local Government Act of 1929. To continue these (100,000) people in medical benefit at (say) 12*s*. a head would cost £60,000. To find this money four methods are suggested :—

1. The Government, by cutting down their contributions to benefits from two-ninths to one-seventh in the case of insured men, and to one-fifth in the case of insured women, has saved some £2,800,000 a year; and a further £800,000 mostly from the 10 per cent. deduction from the doctors' capitation fees. There should be no difficulty therefore in finding £60,000.

HEART HOSPITALS FOR CHILDREN

To the Editor of THE LANCET

SIR,—It is much to be hoped that the "lack of enthusiasm" perceived by your annotator (p. 661) in an American review of children's heart hospitals will not find an echo among those who have been working at this subject in this country. Whatever failure may be found in such a hospital system, it would be cynical to reject it unless an alternative method of control of the disease were simultaneously suggested. There has been much scepticism in the past on the value of sanatorium treatment of pulmonary tuberculosis; nevertheless sanatoria for this disease continue to hold the field and with considerable effect. A similar position is pretty certain to evolve, in spite of financial considerations, in respect of rheumatism of childhood, about which disease it may still be said: "If preventable, why not prevent it?"

I am, Sir, yours faithfully,

MARTIN RAVEN.

Broadstairs, Sept. 18th, 1933.

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SIR,—I have read with great interest the paper by Dr. H. Evans in your issue of Sept. 9th (p. 583). May I suggest that the rise of venous pressure should be estimated. If the cause of the encephalopathy is a rise of venous pressure—such a rise is usually small enough to be measured in centimetres of water—a liberal venesection ought to be of immediate benefit. A rise of venous pressure would produce also a rise of blood pressure, working probably through the vasomotor centres in the brain. It would also cause in some cases a pronounced spasm of the arterioles, in others a dilatation of them. In the first case a venesection would be of benefit; in the second case definitely harmful, if performed suddenly and liberally. The complicated and intricate problems involved are sometimes clarified to a certain degree by measurement of the arterial pressure in the central artery of the retina.

I am, Sir, yours faithfully,

London, Sept. 18th, 1933. N. PINES.

OBITUARY

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Dr. Gardiner, who died at his residence in Manor-place, Edinburgh, on Sept. 8th after a long illness, in his sixtieth year, was a well-known dermatologist. A native of Edinburgh, he graduated in medicine at the University in 1895, took the B.Sc. (Public Health) in 1901, and the M.D., with honours, in 1902. He was made a Fellow of the Royal College of Surgeons of Edinburgh in 1904. He had also studied mental diseases and for a time was assistant medical officer at Dundee Royal Asylum. Later he worked with Sir Robert Philip in the application of X rays to the diagnosis of tuberculosis. At this time he considered taking up a public health appointment, but, preferring to remain in Edinburgh, he turned to the study of skin diseases and, as was to be expected from a man of his working power and tenacity of purpose, he was soon recognised as a sound specialist.

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By his friends Dr. Gardiner was esteemed as a man of great force of character, a hard worker, ready to turn to any problem with his whole power, lucid in exposition, and well up in several departments of medicine. He has left his mark in the skin department of service and will be missed by colleagues and patients. He leaves a widow and two sons, one of whom is a doctor in the city.

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Mr. F. S. Rood, who died in London on Sept. 10th in his 51st year, was educated at University College School and Hospital, and took the conjoint qualification in 1906. Five years later, after further work in Newcastle-on-Tyne, he graduated in medicine at Durham University. After qualifying he was surgical casualty officer, later house surgeon and ophthalmic house surgeon to University College Hospital. Taking up throat and ear work as a specialty he became attached to the Paddington Green and later to the Lambeth and Norwood Children's Hospitals, but he gradually devoted himself more and more to the giving of anæsthetics, and at the time of his death he was senior anæsthetist to University College Hospital. Here he made a name for himself as a pioneer in the intravenous administration of ether, designing the apparatus which was chiefly used so long as that method was in vogue. He then became so expert in regional analgesia that surgeons willingly sought his assistance instead of keeping local anæsthetics in their own hands. He also made considerable use of spinal methods. In general anæsthesia his chief work was in helping to establish the popularity of open ether, working in association with Mr. Wilfred Trotter. Rood was naturally dexterous, and this led him to be asked by some surgeons to assist in a degree unusual for the anæsthetist. He thus made a practical success in two distinct branches of surgical work. In his early days he was an active member of the anæsthetic section of the Royal Society of Medicine.

CORRESPONDENCE

A FATAL X RAY ACCIDENT

To the Editor of THE LANCET

SIR,—The coroner's inquest on the nurse who died suddenly at the Wimbledon Hospital while attending to a patient being X rayed was held in a very noisy road. Evidence was given and questions were asked in an undertone, and it is not surprising that some of the press accounts were inaccurate. I was present at the inquest but not at the accident; the following is an accurate account of what happened at the hospital as reported to me on my return from holiday.

An elderly woman, with a fracture of the neck of the left humerus in extension, was having a stereoscopic pair of skiagrams taken of her left shoulder region, in her bed, in the ward, with the ward trolley X ray set. The operator was an experienced radiographer who was doing locum for the regular sister. She did the same locum last year, and she is in the habit of doing locum work. She was well acquainted with the apparatus, which was in perfect working order (being overhauled regularly every quarter by the makers), and is of modern type such as is used in every hospital of sufficient size to need one. The apparatus was on the patient's left side near the foot of the bed. The house surgeon was standing at the head of the bed in contact with it. The nurse was in attendance on the patient, on the right side near the patient's right shoulder. The nurse was taking no actual part in the radiography. The apparatus was in position, and the current had been switched on twice, first to test the amount of current passing through the tube, and secondly, with the film in position, to make the first of the pair of stereoscopic pictures. The nurse appeared to be concerned about the position of a blanket covering the patient's shoulder, but was warned by the radiographer to "stand clear." She must still have displayed concern about the blanket, because the house surgeon also said in a sharp authoritative voice, "Don't touch. Leave the blanket alone." In spite of these clear warnings immediately beforehand she impulsively put her hand forward, after the exposure had begun, and, obviously coming too close to the high tension circuit, received the shock which killed her. Her movement in spite of warning is unaccountable, but that it was this movement which brought her within the danger zone is incontestable. The suggestion about the bed being insulated and possibly charged to a high potential was a red herring across the track of the inquiry. In the first place under the circumstances, with the properly designed plant that was used, it was impossible to charge the bed, and in the second place, had the bed been so charged the house surgeon, who was already in contact with the bed, must have felt the shock first. (And presumably the patient must have felt some shock when she and the bed were discharged, if such had been the case.)

Until satisfactory shock-proof apparatus of sufficient power is available it is difficult to see how X ray work in the wards is to be made proof against such a foolhardy action as took place on this occasion. Sharp-edged tools have to be used in many occupations, but the risks are negligible so long as the instructions of the experts in charge of the tools are implicitly obeyed, and it is in the expectation of such obedience that operators undertake to use such tools in the presence of the inexpert.

With regard to the comment that a radiology department ought to be in the charge of a medically qualified radiologist, I agree of course; and this is the state of affairs at the Wimbledon Hospital where I am in charge of the department. It is not suggested, I presume, that all the radiography is to be done in the presence of the radiologist, since this would be impossible under present circumstances, and it is for this reason that we train radiographers to do the actual radiography by themselves.

I am, Sir, yours faithfully,

F. T. BURKITT, M.D., D.M.R.E.

Wimbledon Common, S.W., Sept. 18th, 1933.

DENTAL SURGEONS IN THE MEDICAL DIRECTORY

To the Editor of THE LANCET

SIR,—I welcome Dr. Fawcett's letter suggesting the restoration of the names of dental surgeons to the Medical Directory. I have no doubt this might be arranged without greatly enlarging the size of the volume, and I feel sure it would lead to increased circulation. As an old teacher I am frequently approached by medical men seeking particulars of dental surgeons practising in London and elsewhere, as they are unable to obtain the necessary information from the Medical Directory.

I am, Sir, yours faithfully,

MONTAGU F. HOPSON,
Consulting Dental Surgeon, Guy's Hospital.

Sept. 19th, 1933.

To the Editor of THE LANCET

SIR,—The courteous letter of Dr. J. Fawcett in your issue of Sept. 16th calls for a reply from us. It was in our Medical Directory of the year 1866 that we first included a list of dental surgeons. For 59 years we continued this practice, but in 1924 we omitted the list. During these years the dental section had increased from 4 pages to 130 pages.

The reasons for our decision to discontinue the inclusion of the dental section in our volume were mainly twofold. The chief one was the paucity of subscribers amongst members of the dental profession. While medical men are in continual correspondence with one another by letter and by telephone, we do not think that this applies to dental surgeons in anything like the same degree. Consequently our volume was not such a necessity to them. Another reason that actuated us was the ever-increasing bulk of our book. The cogency of this argument is naturally much greater now when it is realised that there are 8000 more medical men than there were in 1924, to say nothing of the increase in the number of dental surgeons.

In the year 1925 we decided to issue the Dental Surgeons' Directory. Our hope that it would prove successful was unfortunately not realised, and we decided to discontinue its publication. We should like to draw attention to the fact that the Medical Directory *does* include particulars of some hundreds of dental surgeons who hold medical, in addition to dental, qualifications.

We are, Sir, yours faithfully,

London, Sept. 18th, 1933. J. & A. CHURCHILL.

⁂ Would it not be possible to test the feeling of subscribers to the Medical Directory?—ED. L.

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MEDICAL NEWS

University of Birmingham

To mark the opening of the new session a reunion of past and present members of the medical school will be held on Tuesday, Oct. 3rd. The morning and afternoon will be devoted to a series of lectures for graduates and final year students, which will be delivered in the lecture theatre of the General Hospital. At 5 P.M. in the medical theatre of the University, Edmund-street, Dr. Arthur Hall, emeritus professor of medicine in the University of Sheffield, will distribute the prizes and deliver an address. At 7.45 P.M. there will be a reception by the Dean in the Great Hall, Edgbaston, and the old students' dinner will be held at 8.15 P.M.

Pharmaceutical Society of Great Britain

Prof. Henry E. Armstrong, F.R.S., will give the inaugural address at the opening of the 92nd session of the school on Wednesday, Oct. 4th, at 3 P.M.

Demonstrations of Contraceptive Technique

At 2.30 P.M. on Wednesday, Oct. 4th, demonstrations of contraceptive technique will be given at the Clinic for Constructive Birth Control and Racial Progress, 108, Whitfield-street, Tottenham Court-road, London, W. 1, to medical practitioners and senior medical students who will be given an opportunity of practising under tuition a variety of methods. A short lecture on methods will be given by Mrs. Marie Stopes, D.Sc., preceding the clinical demonstration by Dr. Evelyn Fisher. Application should be made to the hon. secretary of the C.B.C. at the address given.

Fellowship of Medicine and Post-Graduate Medical Association

A course in medicine and surgery will be given at the Metropolitan Hospital, Kingsland-road, on Oct. 2nd–14th, from 10.30 A.M. to 5.30 P.M. An afternoon course in dermatology will take place at the St. John's Hospital for Diseases of the Skin from Oct. 2nd–28th. An evening course on physical therapy will be held at the London Clinic and Institute of Physical Medicine from Oct. 2nd–25th. A special tutorial course in medicine, surgery, and midwifery for men graduates only has been arranged for the period Sept. 29th to Oct. 3rd, at the Connaught Hall of Residence (University of London), Torrington-square, W.C. A special intensive course in cardiology will take place at the National Hospital for Diseases of the Heart from Oct. 9th–31st. Further particulars of these courses may be had from the secretary of the Fellowship, 1, Wimpole-street, London, W. 1.

Mental Health Conference

The third biennial conference on mental health arranged by the National Council for Mental Hygiene will be held at the Caxton Hall, Westminster, London, S.W., from Nov. 22nd–24th, and will be opened by Prince George, president of the Council. The subjects which will be discussed include the place of mental health in the life of the nation; the working of the Mental Treatment Act, 1930; sex problems of adolescence; suicide and society; the neurotic; punishment or treatment; and the gambling spirit as a national problem. Among the medical men who have promised to take part in the proceedings are Sir Maurice Craig, Prof. W. Langdon Brown, Dr. J. S. I. Skottowe, Dr. J. I. Russell, Dr. E. B. Strauss, Dr. E. Graham Howe, Dr. Elizabeth Sloan Chesser, Dr. Doris Odlum, Dr. Bernard Hart, Dr. J. E. Nicole, Dr. T. A. Ross, Dr. J. R. Rees, Dr. R. G. Gordon, and Dr. H. Crichton-Miller. A special session for medical magistrates only will be held at the Royal Society of Medicine, 1, Wimpole-street, London, W., on Nov. 25th, when the medical attitude to crime will be discussed. Lord Horder will be in the chair, and the speakers will include Dr. M. Hamblin Smith and Dr. R. D. Gillespie. Application for tickets should be made to the secretary of the Council, 78, Chandos House, Palmer-street, London, S.W. 1.

Dr. R. E. Wodehouse has been appointed deputy minister of national health and pensions in the Canadian Government.

Appointments

Barker, M., L.R.C.P. Lond., M.R.C.S., D.P.H., has been appointed Medical Officer of Health, East Ham.

Davies, Edith M., M.B., B.Ch. Wales, D.P.H., Assistant Medical Officer of Health, Rhondda.

Certifying Surgeons under the Factory and Workshops Acts: Blumfield, A., M.B., Ch.B. Liverp. (Barnoldswick, York); Davison, S. C. M., L.R.C.P. Lond., M.R.C.S. (Ashby-de-la-Zouch); Vigurs, C. C., M.D., B.C. Camb. (Newquay, No. 2 District, Cornwall).

Vacancies

For further information refer to the advertisement columns

Altrincham General Hospital.—Jun. H.S. At rate of £120.
Barnstaple, North Devon Infirmary.—Res. M.O. At rate of £150.
Birkenhead Infirmary.—Res. M.O. £300.
Birmingham, Canwell Hall Babies' Hospital.—Res. M.O. At rate of £250.
Burton-on-Trent General Hospital.—Cas. O. and H.P. £150.
Cancer Hospital, Fulham-road, S.W.—Asst. Radiologist. £350. Also H.S. At rate of £100.
Canterbury, Kent and Canterbury Hospital.—H.S. and H.P. Each at rate of £125.
Cardiff, Welsh National School of Medicine.—Jun. Asst. in Medical Unit. £250.
Chester Royal Infirmary.—H.S. £150.
City of London Hospital for Diseases of the Heart and Lungs, Victoria-park, E.—H.P. At rate of £100.
Edinburgh Royal Infirmary.—Clin. Tutor to the Dermatological Dept. £40.
Evelina Hospital for Sick Children, Southwark, S.E.—H.P. At rate of £120.
Grove Park Hospital, Lee, S.E.—Res. Asst. M.O. £350.
Guildford, Royal Surrey County Hospital.—Hon. Orthopædic Surgeon. Also H.S. £150.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—First and Second Asst. Res. M.O.'s. Each at rate of £150. Also H.P. and Jun. H.P. for Frimley Sanatorium. Each at rate of £50.
Hospital for Diseases of the Skin, 71, Blackfriars-road, S.E.—Registrar.
Hospital for Sick Children, Great Ormond-street, W.C.—H.P. and H.S. Each at rate of £100. Also Hon. Med. and Surg. Clin. Assts.
Huddersfield Royal Infirmary.—Jun. Cas. O. and Res. Anæsthetist. £150.
Isleworth, West Middlesex County Hospital.—Part-time Visiting Pathologist. 3 gns. per session.
Kidderminster and District General Hospital.—H.S. £150.
Leeds Maternity Hospital, Hyde-terrace.—Sen. and Jun. H.S.'s. At rate of £52 and £26 respectively.
Liverpool, Royal Southern Hospital.—M.O. to Spec. Depts. and Res. Anæsthetist. At rate of £60.
London Hospital, E.—Second Asst. and Registrar. £300.
E.—Hon. Asst. Surgeon.
M.O. and H.S. At rate
Pendlebury.—Res. M.O.
f £125.
Margate, Princess Mary's Hospital.—Res. Asst. M.O.'s. £350.
Middlesex County Council.—Two Res. Asst. M.O.'s. £400.
Mildmay Mission Hospital, Austin-street, Bethnal Green, E.—Hon. Asst. Gynæcologist.
Nelson Hospital, Merton, S.W.—Two Res. H.S.'s. Each at rate of £100.
e-hill, N.—Res. Asst. M.O. £350.
ary.—Res. Surgeon. £250.
M.O. £300.
Hospital.—Jun. Asst. M.O. At
spital for Children, Shadwell, E.—
H.P., Cas. O. Each at rate of £125.
Queen's Hospital for Children, Hackney-road, E.—Asst. Surgeon.
Radium Institute, Riding House-street, W.—H.S. At rate of £150.
Rowley Regis U.D.C.—Aural Specialist. 2½ guineas per session.
Royal Free Hospital, Gray's Inn-road, W.C.—Res. Cas. O. £150.
St. John's Hospital, Lewisham, S.E.—Res. M.O. £200.
Salisbury, General Infirmary.—H.S. At rate of £150.
Sheffield Royal Infirmary.—Clin. Asst. to the Dermatological Dept. £300.
Southern Rhodesia Medical Service.—Government M.O. £500.
—H.P. At rate of £150.
nary.—Asst. H.P. £125.
ital.—Sen. House M.O.
At rate of £150.
Warwick, King Edward VII. Memorial Sanatorium, Hertford Hill.—Jun. Asst. M.O. At rate of £200.
Westminster Hospital, Broad-sanctuary, S.W.—H.S. to Ear, Nose and Throat and Eye Dept. At rate of £120.
Westminster Hospital Annexe, 66, Fitzjohn's-avenue, Hampstead, N.W.—Res. M.O. £200.
Wigan, Royal Albert Edward Infirmary.—Hon. Surgeon, Hon. Asst. Physician. Also Res. Med. and Surg. O. and Registrar. At rate of £250.

The Chief Inspector of Factories announces a vacant appointment for a Certifying Factory Surgeon at Coldstream, Berwick.

NOTES, COMMENTS, AND ABSTRACTS

EXERCISES DURING PREGNANCY AND THE PUERPERIUM

A group of students demonstrating exercises.

[*By courtesy of the "Nursing Times."*

THE need for a *certain* amount of regular physical exercise during pregnancy has long been recognised. In the past a woman was encouraged to continue her household duties almost to term, even when these involved heavy sweeping and scrubbing, though to what extent this was making a virtue of necessity it is difficult to judge. It is certain that many "household duties" are generally tiring without bringing into play the special voluntary muscles, the intelligent use of which, on the part of the mother, might possibly help her and her accoucheur at the crucial moment of delivery and later might expedite the restoration of normal tone. On the assumption that the exercises in which the abdominal and pelvic muscles are brought into play have a special value before, during, and after childbirth, Miss M. Randell, sister-in-charge of the School of Massage and Medical Gymnastics, St. Thomas's Hospital, and Miss Margaret Morris, of the Margaret Morris Movement School, have devised exercises which are especially adapted for the use of (1) the potential mother, (2) the expectant mother, (3) the puerperal mother, and (4) the post-puerperal mother.

Examples of these exercises, which were recently demonstrated at a meeting of the London Association of the Medical Women's Federation by massage students from St. Thomas's Hospital.

GROUP 1 (*for the potential mother*) includes exercises designed to teach correct posture with special attention to keeping the long axis of the body in a straight line.

The patient is asked to stand with feet slightly apart and placed parallel; instruction is then given in the correct poise of the body, which forms the foundation of all the exercises. The patient is taught how to control the various muscle groups. For example, she is asked to do a bilateral contraction of the glutei ("squeeze the cheeks of the buttocks towards each other"), and to note that this effort also approximates the thighs (adduction) and externally rotates and extends the knees. The body-weight is transferred to the outer side of each foot and the four outer toes, the feet are inverted and the ground is pushed away, as it were, by the soles of the feet. This is called "the strong position." The patient is instructed to think of her lower extremities as actively thrusting her trunk upwards, and is asked to note that there is an upward movement of the pelvic floor which occurs with the strong (simultaneous) action of the adductors. Her attention is then directed to her sphincters, and she is asked to tighten them and draw them upwards, and to note the simultaneous flattening of her abdominal wall that occurs with the gluteal contraction. This contraction can be still further increased by an attempt to make her abdomen recede. She is then asked to note that the hollow in her lumbar region is less, that her spine is straighter, that her lower ribs are wider, that her chest is higher, the back of her neck is well stretched, and her head level. A plumb line dropped from the lower part of the sternum will now fall in front of the pubis, whereas in an incorrect posture it rests on the abdomen.

Where there is a tendency to stiffness, exercises for flexibility of the spine are given.

The patient is asked to kneel, then sit back on her heels flexing her trunk forward until her head rests on her knees, her forearms on the ground. She is then asked to unfold, as it were, so that each part of the spine is gradually straightened from the sacrum upwards, leaving her head until last; the patient "breathes in" deeply in raising herself, and she is directed to keep her abdominal wall flat throughout; the forearms are drawn backwards until they rest on the knees. This is particularly useful in compressing the viscera and aiding the portal circulation.

GROUP 2 (*for the expectant mother*).—The muscles used in the standing exercises are used in other positions during pregnancy. The expectant mother is taught to contract groups of muscles while lying on an inclined plane, pelvis and legs being raised.

In sitting, bilateral contraction of the glutei, with simultaneous contraction of the abdominal wall and drawing upward of the pelvic floor, is held to be useful. If the arms are held at right angles to the trunk, with the hands at right angles to the arms, and the patient is asked to add a strong bilateral pushing movement to the above, the activity of the abdominal muscles is still stronger.

In the early months of pregnancy patients are trained in what is called a *delivery exercise*, devised by Miss Morris, care being taken to avoid strain.

Patient lies on the right side with right leg extended, left knee flexed and supported by both hands clasped under the knee. The patient holds this position and breathes in for six seconds. She then arches the back as strongly

as possible, and presses down her left knee against her hands, for six seconds, contracting all her muscles. She holds this "strong position" for a further period of six seconds, and then relaxes completely, allowing the left leg to rest on the bed, and rounding the back slightly. She does this for six seconds, breathing out and relaxing as much as possible. She then repeats the exercise from the beginning. When she has relaxed for the second time, she slowly assumes a position on her back with flexed and outwardly rotated thighs, flexed knees, and the soles of the feet together (if possible). The hands support the backs of the thighs just below the buttocks. Having taken six seconds to assume this position, she then arches the back as much as possible for six seconds, breathing in the whole time.

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THE health of the modern school child is promoted in many ways, of which the most important are (1) the inculcation in his mind of health as an ideal, and (2) the periodical examination of his body structure and functions in order to ensure that abnormalities are detected and treated at an early stage. The first of these duties falls primarily on the teacher, the second on the school medical service, for the efficiency of which the coöperation of teachers with nurses and doctors is essential. The teacher is thus a vital part of the machinery of preventive medicine, whose equipment for his responsibilities depends on his capacity for absorbing principles which are not always easy to define, still less to apply. His task is complicated by the fact that our conception of hygiene is not static. If he is to help his pupils to acquire its elements he must keep himself up to date. Recognising his needs, the Board of Education has published a Handbook of Suggestions on Health Education[1] (incorporating two previous pamphlets in revised form), of which the main purpose is to encourage teachers to create in the minds of boys and girls during the years of adolescence an understanding and cultivation of health. Sir George Newman points out in an introduction that the handbook should not be regarded as a course or series of courses to be systematically worked through in class lessons, but as a compendium to be considered in planning progressive courses of training appropriate to the ages of the children. It is divided into two main sections, devoted respectively to the health of the individual and to that of the community. Of the seven chapters into which the first section is divided—body and mind; conditions of bodily health; the hygiene of food and drink; health education and the school curriculum; the practice of health habits; biology and health; and mothercraft and infant care—only one (the first) is unsatisfactory, gliding as it does in less than eight pages over human anatomy, physiology, pathology, and psychology. The following chapters are informative without being too dogmatic; for example, it is clearly stated (p. 32) that we have no means as yet of being able to prevent dental decay, however much care is taken, though the importance of such measures as are known to minimise the risk is insisted on. In this connexion it is regrettable that attention is not drawn to the desirability of renewing toothbrushes at least once a year, and of their occasional disinfection.

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officers of the school medical service in any area is always uncertain. For example, a high percentage of defects found may suggest bad local conditions or exceptionally thorough ascertainment; similarly a low prevalence of skin affections and of uncleanliness may indicate real progress or somewhat casual examination. An attempt has recently been made in America to make a statistical comparison of efficiency based not on results but on the methods employed.[2] A series of tests were made, some of which are analogous to the American Army intelligence tests, to test the knowledge and activities of the teachers and nurses, and of the extent of their coöperation with each other and with co-workers such as the doctor, the dentist, and the "oral hygienist"—an officer whose duties are to clean the children's teeth, examine them, and record the lesions or abnormalities needing attention. The fundamental elements in the school health programme are grouped under the headings: adequate examination; persistent follow-up; teachers' participation and responsibility in all aspects of the programme [sic]; live records; rapport among staff members. At first glance this list seems to omit the vital factor of the degree to which the coöperation of the parents has been enlisted; possibly this is covered by persistent follow-up, which would hardly be tolerated by unsympathetic parents.

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The figures obtained using these indices of adequacy were poor, e.g., the throat was inspected as laid down in only 34 per cent. of the examinations, and the conjunctiva in only 27 per cent. It is suggested that more time is needed for each child, and might be obtained by adopting a system in which the school doctor would examine only those children referred to him by the teacher (and presumably by the nurse). The opinion that a school doctor should in some way be enabled to allot more time for difficult cases than he can at present is widely held in our own country; but few of us here would agree that "to pick individuals out from a group because they need attention is not an essential function of the school physician." The innovation desired by several medical officers in Great Britain would be rather that every child should be medically "inspected," and a minority reserved for a full and searching examination, the latter of course including children about whom the teachers had expressed anxiety.

We are not impressed with the scheme outlined above as a fair method of comparison between the efficiency of the school medical service in different areas. Its results might have dreadful iconoclastic effects on work which is probably on the whole adequate to its purpose, even if the ailing or defective child is picked out by clinical instinct rather than sifted by an elaborate network. In this country the provision of suitable literature and of opportunity for meetings between doctors, nurses, and teachers is gradually promoting close coöperation, and it seems unlikely that tests of efficiency would do much to hasten its advent.

EVERYDAY SCIENCE AS A DEGREE SUBJECT

UNDER new regulations which come into force on the first day of Full Michaelmas Term, 1933, a knowledge of "everyday science" will be required for the ordinary B.A. degree at Cambridge University. For Part I. of the general examination candidates must take four of six papers, three of which are compulsory; and for the first time one of these deals with everyday science. The schedule of this subject was published in the *Reporter*, 1932–33, p. 1192, and runs as follows:

Gravitation; work; energy; power; machines. Solids, liquids, and gases: molecular theory of matter. Properties of solids: crystalline structure, elasticity. Properties of liquids, hydraulic contrivances, surface tension, solution, crystallisation. Properties of gases, diffusion: pumps. The atmosphere: atmospheric pressure and winds: weather-maps: composition of the atmosphere; combustion and oxidation. Mixtures and compounds: atoms and molecules chemical equations. Heat and temperature: transfer of heat: transformation of heat: engines and fuels. Waves, their propagation and properties. Propagation and characteristics of sound: hearing: recording and reproduction of sound. Common optical instruments: artificial lighting: colour: spectroscopy, invisible radiations. Heating and magnetic effects of electric current: motor, dynamo, and transformer: transmission of power: electrolysis: acids, alkalis, salts: conduction of electricity through gases: the valve: X rays. Structure of the atom: periodic law: radioactivity. Common chemical elements and their principal compounds.

Characteristics of living organisms. The cell. The elements of mammalian anatomy and physiology illustrated from man. A flowering plant as an illustration of elementary plant anatomy and physiology. Bacteria. Relationships of bacteria, green plants, and animals. Reproduction in plants and animals. Development. The elements of Mendelian inheritance. Evolution. Adaptation. Economic importance of Biology.

The constituents of human diet: the nature and value of the principal foodstuffs: the vitamins: food transport and preservation: water-supply. Parasites and saprophytes: bacteria. The causes of infectious diseases: the history and nature of epidemics: the prevention of infection. The history of inoculation, vaccination, and serum treatment. Occupational diseases. The duty of the individual and of the State in the prevention and control of disease.

It should be noted that general science has not been made a subject for Part I. of the natural sciences tripos.

NEW PREPARATIONS

PANDIGAL.—Messrs. Beiersdorf, Ltd., manufacturing chemists, of Welwyn Garden City, Herts, have sent us specimens of Pandigal, a preparation of *Digitalis lanata* Ehrhardt, the active principle of which is the glucoside Lanadigin. Among the advantages claimed for Pandigal over preparations

as possible, and presses down her left knee against her hands, for six seconds, contracting all her muscles. She holds this "strong position" for a further period of six seconds, and then relaxes completely, allowing the left leg to rest on the bed, and rounding the back slightly. She does this for six seconds, breathing out and relaxing as much as possible. She then repeats the exercise from the beginning. When she has relaxed for the second time, she slowly assumes a position on her back with flexed and outwardly rotated thighs, flexed knees, and the soles of the feet together (if possible). The hands support the backs of the thighs just below the buttocks. Having taken six seconds to assume this position, she then arches the back as much as possible for six seconds, breathing in the whole time.

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[2] An Evaluation of School Health Procedures. By Raymond Franzen, Ph.D., Director of Research, American Child Health Association. New York: American Child Health Association. Pp. 127. 90 cents.

She then holds the arched position for a further six seconds, after which she relaxes, breathes out, and rolls over on to her side, resuming the position from which she started. The exercise can then be repeated on the other side and can with advantage be done to music.

GROUP 3 (*for the puerperal mother*).—During the puerperium the recumbent patient is taught to contract all her muscles, paying special attention to the adductors and pelvic floor muscles.

Lying with knees flexed and feet resting on the bed, the patient is asked to raise her pelvis off the bed until the hip-joint is fully extended; she then presses her knees and thighs together, draws her pelvic floor upwards, tightening her sphincter muscles. If she is asked to shrink away from an imaginary tight binder or belt, in front, laterally and posteriorly, she will more easily get an idea of strong muscular contraction.

This is said to be a useful exercise to correct visceroptosis, and when the patient understands it, can be practised in any position and localised to the abdomen, in order to gain control and muscle strength.

An exercise designed to *increase lactation* is that of stretching the arms obliquely upward and relaxing with crossing. This exercise, which can be done to music, has also been found useful in relieving tension in engorged breasts.

GROUP 4 (*for the post-puerperal mother*).—The patient kneels with hands on floor, she then arches her back in a cat-like movement, strongly contracting her abdominal muscles. From the same original position she is asked to sit back on her heels and is taught an undulating movement of her trunk. A similar movement is performed making the body pass through a circle laterally. The all-fours position is designed to correct any tendency to retroversion of the uterus, and the exercises to give localised work to the abdominal muscles and stimulate the blood-supply to the visceral organs.

Respiratory exercises are taught to all groups.

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Characteristics of living organisms. The cell. The elements of mammalian anatomy and physiology illustrated from man. A flowering plant as an illustration of elementary plant anatomy and physiology. Bacteria. Relationships of bacteria, green plants, and animals. Reproduction in plants and animals. Development. The elements of Mendelian inheritance. Evolution. Adaptation. Economic importance of Biology.

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PARAGON SURGICAL PLASTERS.—Messrs. T. J. Smith and Nephew, Ltd., of Hull, are now issuing their well-known zinc-oxide surgical plasters in snap cylinders—that is to say, the spool containing the plaster fits into a cylinder of tin, in which it is retained by a small projecting stud. Pressure with the fingers releases the spool or refixes it in its case after use. This makes a convenient and an effective protection for the plaster when not in use. The spools contain 2½, 5, and 10 yards of plaster, the width of which varies from ½ to 4 inches.

Medical Diary

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.

Thursday, Sept. 28th.—8 P.M., Prof. Dr. Hans Maier: Practical Experience of Sterilisation in Switzerland over the past 50 years. (The lecture will be given in English.)

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

Monday, Sept. 25th, to Saturday, Sept. 30th.—Hospital for Consumption, Brompton. Intensive Course in Diseases of the Chest. All day.—Westminster Hospital, S.W. Post-graduate Course in Medicine and Surgery (for men graduates only). All day.—Gordon Hospital, Vauxhall Bridge-road, S.W. Course in Proctology. All day.—Connaught Hall, Torrington-square, W.C. Tutorial Course in Medicine, Surgery, and Midwifery (for men graduates only). All day, beginning Friday.—Panel of Teachers. Individual clinics are available by special arrangement with the Fellowship of Medicine. Courses, &c., open only to Members of the Fellowship.

ST. MARY'S HOSPITAL POST-GRADUATE COURSE.

Friday, Sept. 29th.—10.15 A.M., Mr. Duncan Fitzwilliams: Carcinoma of the Rectum. 11 A.M., Mr. Leslie Williams: Some Remarks on Pre- and Post-natal Care. 12 A.M., Mr. J. Bright Banister: Contraception. 2.15 P.M., Dr. Wilfred Harris: Neurological Emergencies. 3.15 P.M., Dr. T. C. Hunt: Types of Functional Indigestion and their Treatment.

Saturday.—10.15 A.M., Mr. Aleck Bourne: The Gynæcological Aspect of Certain Neuroses. 11 A.M., Dr. Reginald Miller: The Acidosis Pandemic in Children. 12 A.M., Sir William Willcox: Rheumatoid Arthritis and Allied Conditions. 2:15 P.M., Mr. T. G. Stevens: Irregular Hæmorrhage at the Menopause. 3.15 P.M., Dr. A. Hope Gosse: Lantern Demonstration of Recent Advances in the Diagnosis and Treatment of Diseases of the Chest.

Sunday, Oct. 1st.—10.15 A.M., Mr. V. Zachary Cope: Some Common Mistakes in Surgical Diagnosis. 11 A.M., Dr. C. M. Wilson: Errors in Diagnosis. 12 A.M., Mr. A. Dickson Wright: Arterial Diseases of the Extremities. (These lectures are open to all medical practitioners without fee.)

CHARING CROSS HOSPITAL MEDICAL SCHOOL POST-GRADUATE COURSE.

Saturday, Sept. 30th.—10 A.M., Mr. J. B. Banister: Prolapse. 11 A.M., Dr. J. E. M. Wigley: Eczema and/or Dermatitis. 12 A.M., Mr. L. R. Broster: Surgical Emergencies. 2 P.M., Dr. Gordon Holmes: Paraplegia. 3 P.M., Dr. E. C. Warner: Recent Advances in the Treatment of Medical Diseases. 4 P.M., Mr. A. C. MacLeod: Some Surgical Cases of Interest.

Sunday, Oct. 1st.—10 A.M., Mr. E. D. D. Davis: Pathology and Treatment of Suppuration of the Antrum. 11 A.M., Dr. K. Shirley Smith: Syphilis of the Heart. 12 A.M., Mr. Peter Daniel: Diagnosis and Treatment of Common Rectal Diseases. 2 P.M., Dr. R. A. Hickling: Demonstration of Cases. 3 P.M., Dr. N. C. Lake: Value of Pre-operative Investigations. 4 P.M., Mr. R. A. Fitzsimons: Treatment of Fractures. (This course is open only to graduates and students of the school.)

ST. THOMAS'S HOSPITAL POST-GRADUATE COURSE.

Monday, Sept. 25th.—10 A.M., Dr. Yellowlees: The Disposal of Cases of Early Mental Disease. 11.15 A.M., Mr. Mitchiner: Treatment of Burns and Sepsis. 2 P.M., Dr. Tidy: Medical Round. 4.30 P.M., Dr. Z. Mennell: Anæsthesia.

Tuesday.—10 A.M., Dr. Herbert: Artificial Pneumothorax. 11.15 A.M., Prof. Dudgeon: Septicæmia. 2 P.M., Mr. Max Page: Surgical Round. 4.30 P.M., Dr. Russell: The Electrocardiogram as an Aid to Diagnosis.

Wednesday.—10 A.M., Dr. Shires: The Uses of Radium and X Ray Treatment in General Practice. 11.15 A.M., Dr. Dowling: Skin Diseases. 2 P.M., Dr. Hedley: Adelaide Ward. 3.30 P.M., Dr. Jewesbury: Diseases of Children. 4.30 P.M., Dr. J. B. Mennell: Low Backache.

Thursday.—10 A.M., Prof. Cowell: Dietetics. 11.15 A.M., Dr. Wyatt: Antenatal Care and Examination and the Significance of Albumin in the Urine of Pregnant Women. 2 P.M., Dr. Cassidy: Medical Round. 4.30 P.M., Col. Harrison: Demonstration of V.D. Cases and their Treatment.

Friday.—10 A.M., Dr. Gardiner Hill: Endocrine Problems in the Special Departments of Medicine. 11.15 A.M., Prof. De Wesselow: Acute and Chronic Nephritis. 2 P.M., Mr. Nitch: Surgical Round with special reference to Urological Cases. (This course is open only to graduates and students of the school.)

WESTMINSTER HOSPITAL POST-GRADUATE SCHOOL.

Saturday, Sept. 30th.—9.30 A.M., Dr. Adolphe Abrahams: Indigestion. 10.15 A.M., Dr. W. E. Lloyd: P.U.O. 11.30 A.M., Mr. Gilbert Chubb: Earache. 12.15 P.M., Mr. Arthur Griffith: Sore Eyes. 2 P.M., Mr. E. R. Brockman: Backache. 2.45 P.M., Mr. C. Price Thomas: Acute Abdominal Pain. 4 P.M., Dr. Hildred Carlill: Fatigue. 4.45 P.M., Dr. S. E. Dore: Itching.

Sunday, Oct. 1st.—9.30 A.M., Dr. Donald Paterson: Anorexia in Children. 10.15 A.M., Mr. Tudor Edwards: Frequency of Micturition. 11.30 A.M., Mr. Stanford Cade: Difficulty in Swallowing. 12.15 P.M., Dr. Arnold Stott: Cough. 2 P.M., Mr. Stanley Dodd: Menorrhagia. 2.45 P.M., Mr. E. Rock Carling: Common Fractures. (This course is open only to graduates and students of the school.)

PRINCESS ELIZABETH OF YORK HOSPITAL FOR CHILDREN, Shadwell, E.

Friday, Sept. 29th.—8.45 P.M., Prof. D. F. Fraser-Harris: Science and Poetry.

MANCHESTER ROYAL INFIRMARY.

Tuesday, Sept. 26th.—4.15 P.M., Dr. W. Brockbank: Treatment of Cough.

Friday.—4.15 P.M., Mr. Harry Platt: Demonstration of Orthopædic Cases.

Births, Marriages, and Deaths

BIRTHS

ANDERTON.—On Sept. 18th, in London, the wife of Captain Geoffrey Anderton, R.A.M.C., of a daughter.

CAFFREY.—On Sept. 6th, at Upper Pembroke-street, Dublin, the wife of Dr. P. J. Caffrey, W.A.M.S., of a daughter.

MACKENZIE.—On Sept. 15th, at Royal Naval College, Dartmouth, the wife of Surgeon-Commander K. A. Ingleby Mackenzie, R.N., of a son.

MCEWAN.—At Fernbrae, Dundee, on Sept. 13th, to Dr. and Mrs. T. Lawson McEwan, of 1, West-avenue, Exeter, Devon—a daughter.

MARRIAGES

BROAD—WEBB.—On Sept. 16th, at All Souls, Langham-place, James Vickers Broad, M.A., M.B. Camb., to Eileen Webb, M.B., B.S. Lond.

DRUCE—LAWRENCE.—On Sept. 16th, at the Parish Church, Croydon, Geoffrey Robert Goring Druce, L.D.S. R.C.S. Eng., to Margaret Joyce, elder daughter of Mr. and Mrs. D. A. Lawrence, of Addiscombe.

PERKINS—FALCONER.—On Sept. 9th, at St. Andrew's Presbyterian Church, Cheam, Surrey, Flight-Lieutenant Philip Harry Perkins, Royal Air Force, M.R.C.S., L.R.C.P., to Margaret Ogilvie, only daughter of the late Dr. Frank Falconer and of Mrs. Falconer, London.

THOMPSON—NUTHALL.—On Sept. 16th, at Esher, Keith Stewart Thompson, M.R.C.S., L.R.C.P. Lond., to Kathleen Ormsby, elder daughter of the late Mr. P. Nuthall and Mrs. Nuthall, of "Little Spinney," Esher.

DEATHS

BOWER.—On Sept. 16th, at Elton House, Gloucester, Ernest Dykes Bower, M.D., F.R.C.S. Edin., aged 79 years.

BOYD.—On Sept. 12th, at Carrick-road, Ayr, James Paton Boyd, M.B., C.M., late of Glasgow.

COATES.—On Sept. 15th, at Pentland-terrace, Edinburgh, Charles Middleton Coates, L.R.C.P., L.R.C.S.

GLYNN.—On Sept. 18th, at Leeds General Infirmary, Philip Edward Glynn, F.R.C.S. Eng., resident orthopædic officer.

HELME.—On Sept. 12th, at Oakroyd, Silverdale, Carnforth (formerly of Rusholme, near Manchester), James Milner Helme, M.D., in his 81st year.

HUGHES.—On Sept. 18th, at Eastbridge, Croydon, Morgan Hughes, M.R.C.S., L.D.S. Eng., aged 73 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

ADDRESSES AND ORIGINAL ARTICLES

TREATMENT OF URINARY INFECTIONS IN THE PUERPERIUM

BY A KETOGENIC DIET

By A. T. Fuller, Ph.D. Lond., F.I.C.
BIOCHEMIST AT THE BERNHARD BARON MEMORIAL RESEARCH LABORATORIES, QUEEN CHARLOTTE'S HOSPITAL; AND

Leonard Colebrook, M.B. Lond.
MEMBER OF THE SCIENTIFIC STAFF OF THE MEDICAL RESEARCH COUNCIL

(*With the Collaboration of the Clinical Staff of Queen Charlotte's Hospital*)

About 25 per cent. of the patients admitted to the Isolation Block of Queen Charlotte's Hospital with puerperal fever have, or develop, a bacterial infection of the urinary tract. *B. coli* or a nearly related organism is most commonly found—less often a staphylococcus, fæcal streptococcus, or (occasionally) *Streptococcus pyogenes*. The amount of pus is very variable—some cases have very little. Blood and casts are seldom seen. Whether these infections are usually limited to the bladder or involve also the renal pelvis and ureters, we do not yet know. Many of them have practically no urinary symptoms when they come to hospital; some have a little frequency for a few days at the onset of the infection; a minority have definite lumbar pain as well as frequency. We hope to get more data as to the pathology of the condition by means of ureteric catheterisation in the next few months. In many cases it is difficult to determine how far the pyrexia is referable to the urinary infection and how far to the associated infection of the genital tract tissues.

The treatment of these patients up till midsummer, 1932, was on conventional lines—by large doses of potassium citrate and ample fluids—and occasionally, in the more severe ones, by acriflavine or some other so-called urinary antiseptic. They became symptom-free and the fever subsided, but the bacilluria remained in the great majority of cases. The after-history is not well known, but in a recent investigation of 48 cases by Miss Dodds [1] one-half were found to have a sterile urine after six months.

Following the observation by Clark and Helmholz [2] [3] that cases of long-standing bacilluria would sometimes clear up in a remarkable manner on a diet rich in fats and poor in carbohydrate, we have employed a similar diet in the treatment of 54 of these cases of puerperal urinary infection during the last 12 months.

This communication records what we have learned from this experience up to date, without attempting to offer any final conclusions. There is little doubt that the ketogenic diet is a valuable therapeutic agent but there is much still to be learned about it. With more experience better results will almost certainly be obtained.

The Diet

It has been known for some years that if the body is starved of carbohydrate food the normal metabolism of fats is interfered with—the fatty acids being incompletely broken down, with the result that β-oxybutyric acid, aceto-acetic acid, and acetone (collectively spoken of as "ketones" or "ketone bodies") appear in the urine. The acidity of the urine is also considerably increased. Helmholz [4] and later Dick [5] showed that the growth of *B. coli*, which in normal urine proceeds rapidly, is very much delayed in such ketonic urine or may be entirely prevented—the organisms being killed. These inhibitory or bactericidal effects have been shown by Fuller [6] to be chiefly dependent upon the amount of β-oxybutyric acid present in the urine, plus a sufficient degree of acidity. In our patients with urinary infection the bacilluria usually terminates abruptly as soon as these conditions are obtained. The aim of the ketogenic diet, therefore, should be to induce a ketosis of this degree. In our earlier efforts to that end we gave the patients about 250 g. of fat per diem and restricted their carbohydrate intake to about 30 g. by cutting out all bread, sugar, and sugar- or flour-containing foods except milk. In some patients this proved adequate, but in many it failed to induce a satisfactory ketosis. It seemed necessary to limit the carbohydrates still further. For the past six months we have been able to get it down to a daily ration of about 10 g. by eliminating the lactose contained in milk and cream. This we do by disallowing milk and substituting for dairy cream a lactose-free "synthetic" cream (vide infra).

The present diet is made up roughly as follows and is given to all the patients in whom we wish to induce a ketosis—irrespective of their weight, unless this is quite exceptional.

Fat (250 g.).—We dispose of the fat as 150 g. in the form of cream (14 oz. of 40 per cent. cream being used per diem in soup, fruit fool, cream moulds, ice-cream, and in tea or coffee); 75 g. in 3 oz. of butter which is spread on gluten rolls and also used in making scrambled eggs; 25 g. in the form of bacon or meat fat.

Carbohydrate (10 g.).—Practically all the carbohydrate is contained in vegetables and fruit—viz., cabbage, spinach, celery, cucumber, lettuce, cress, tomatoes, gooseberries fresh or bottled, fresh rhubarb, strawberries, and cranberries when obtainable.

Protein (80 g.).—The protein, which can be cut down if desired, is given in meat, fish, eggs, gluten rolls, and St. Ivel cheese.

The chief difficulty has been the patients' dislike for so large a proportion of fat, but it can be overcome to a considerable extent by an experienced cook. Sample of an actual week's dietary is given below.

SUPPLEMENTARY NOTES ON DIET

Only *saccharine* may be used for sweetening.

The total *fluid intake* should be restricted to 2 pints in the 24 hours. Lemonade should be made with fresh lemons and saccharine. Plain soda-water is allowed.

Synthetic cream.—For making this a salt-free butter is essential. Casein solution is made up daily by dissolving 1 oz. of soluble light white casein (British Drug Houses) in 1½ pints of water, steaming in a double cooker and straining through muslin before use. To make the cream 3 oz. of this solution warmed with a little saccharine is mixed with 2 oz. of melted butter and pumped through a cream machine (Pentocreme or Empire type). Ice-cream can be made by mixture of this cream with gelatin and eggs and some flavouring such as vanilla, in an ice and salt box. *Soups* are prepared from bone and meat stock with cream but without potato or thickening. Tomato, Lemco, Marmite, or bay leaves can be used for flavouring. A helping contains 4 oz. cream.

Vegetables.—Brussel sprouts, cauliflower, or kale may replace cabbage and spinach, but not more than 3 oz. should be allowed at any one meal. White sauce mad
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made from *D. purpurea* are more rapid digitalisation, accurate dosage, absence of toxic symptoms, and a constant and uniform pharmacological action, while its potency is stated to be indefinitely maintained. The preparation is put up in liquid form in drop bottles, which contain 7·5 and 15 c.cm. respectively, and in bottles of 100 c.cm. for dispensing. Tablets each containing 0·4 mg. of lanadigin are sent out in packets of 12, 50, and 250; suppositories and ampoules are also supplied. The dose is 8, 15, or 25 drops (half to one and a half tablets) three times per day. Pandigal may also be given in conjunction with calcium products for injection. Evidence of its convenience and efficacy is given from a number of German hospitals and clinics.

PARAGON SURGICAL PLASTERS.—Messrs. T. J. Smith and Nephew, Ltd., of Hull, are now issuing their well-known zinc-oxide surgical plasters in snap cylinders—that is to say, the spool containing the plaster fits into a cylinder of tin, in which it is retained by a small projecting stud. Pressure with the fingers releases the spool or refixes it in its case after use. This makes a convenient and an effective protection for the plaster when not in use. The spools contain 2½, 5, and 10 yards of plaster, the width of which varies from ½ to 4 inches.

Medical Diary

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.

THURSDAY, Sept. 28th.—8 P.M., Prof. Dr. Hans Maier: Practical Experience of Sterilisation in Switzerland over the past 50 years. (The lecture will be given in English.)

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 25th, to SATURDAY, Sept. 30th.—HOSPITAL FOR CONSUMPTION, Brompton. Intensive Course in Diseases of the Chest. All day.—WESTMINSTER HOSPITAL, S.W. Post-graduate Course in Medicine and Surgery (for men graduates only). All day.—GORDON HOSPITAL, Vauxhall Bridge-road, S.W. Course in Proctology. All day.—CONNAUGHT HALL, Torrington-square, W.C. Tutorial Course in Medicine, Surgery, and Midwifery (for men graduates only). All day, beginning Friday.—PANEL OF TEACHERS. Individual clinics are available by special arrangement with the Fellowship of Medicine. Courses, &c., open only to Members of the Fellowship.

ST. MARY'S HOSPITAL POST-GRADUATE COURSE.

FRIDAY, Sept. 29th.—10.15 A.M., Mr. Duncan Fitzwilliams: Carcinoma of the Rectum. 11 A.M., Mr. Leslie Williams: Some Remarks on Pre- and Post-natal Care. 12 A.M., Mr. J. Bright Banister: Contraception. 2.15 P.M., Dr. Wilfred Harris: Neurological Emergencies. 3.15 P.M., Dr. T. C. Hunt: Types of Functional Indigestion and their Treatment.

SATURDAY.—10.15 A.M., Mr. Aleck Bourne: The Gynæcological Aspect of Certain Neuroses. 11 A.M., Dr. Reginald Miller: The Acidosis Pandemic in Children. 12 A.M., Sir William Willcox: Rheumatoid Arthritis and Allied Conditions. 2.15 P.M., Mr. T. G. Stevens: Irregular Hæmorrhage at the Menopause. 3.15 P.M., Dr. A. Hope Gosse: Lantern Demonstration of Recent Advances in the Diagnosis and Treatment of Diseases of the Chest.

SUNDAY, Oct. 1st.—10.15 A.M., Mr. V. Zachary Cope: Some Common Mistakes in Surgical Diagnosis. 11 A.M., Dr. C. M. Wilson: Errors in Diagnosis. 12 A.M., Mr. A. Dickson Wright: Arterial Diseases of the Extremities. (These lectures are open to all medical practitioners without fee.)

CHARING CROSS HOSPITAL MEDICAL SCHOOL POST-GRADUATE COURSE.

SATURDAY, Sept. 30th.—10 A.M., Mr. J. B. Banister: Prolapse. 11 A.M., Dr. J. E. M. Wigley: Eczema and/or Dermatitis. 12 A.M., Mr. L. R. Broster: Surgical Emergencies. 2 P.M., Dr. Gordon Holmes: Paraplegia. 3 P.M., Dr. E. C. Warner: Recent Advances in the Treatment of Medical Diseases. 4 P.M., Mr. A. C. MacLeod: Some Surgical Cases of Interest.

SUNDAY, Oct. 1st.—10 A.M., Mr. E. D. D. Davis: Pathology and Treatment of Suppuration of the Antrum. 11 A.M., Dr. K. Shirley Smith: Syphilis of the Heart. 12 A.M., Mr. Peter Daniel: Diagnosis and Treatment of Common Rectal Diseases. 2 P.M., Dr. R. A. Hickling: Demonstration of Cases. 3 P.M., Dr. N. C. Lake: Value of Pre-operative Investigations. 4 P.M., Mr. R. A. Fitzsimons: Treatment of Fractures. (This course is open only to graduates and students of the school.)

ST. THOMAS'S HOSPITAL POST-GRADUATE COURSE.

MONDAY, Sept. 25th.—10 A.M., Dr. Yellowlees: The Disposal of Cases of Early Mental Disease. 11.15 A.M., Mr. Mitchiner: Treatment of Burns and Sepsis. 2 P.M., Dr. Tidy: Medical Round. 4.30 P.M., Dr. Z. Mennell: Anæsthesia.

TUESDAY.—10 A.M., Dr. Herbert: Artificial Pneumothorax. 11.15 A.M., Prof. Dudgeon: Septicæmia. 2 P.M., Mr. Max Page: Surgical Round. 4.30 P.M., Dr. Russell: The Electrocardiogram as an Aid to Diagnosis.

WEDNESDAY.—10 A.M., Dr. Shires: The Uses of Radium and X Ray Treatment in General Practice. 11.15 A.M., Dr. Dowling: Skin Diseases. 2 P.M., Dr. Hedley: Adelaide Ward. 3.30 P.M., Dr. Jewesbury: Diseases of Children. 4.30 P.M., Dr. J. B. Mennell: Low Backache.

THURSDAY.—10 A.M., Prof. Cowell: Dietetics. 11.15 A.M., Dr. Wyatt: Antenatal Care and Examination and the Significance of Albumin in the Urine of Pregnant Women. 2 P.M., Dr. Cassidy: Medical Round. 4.30 P.M., Col. Harrison: Demonstration of V.D. Cases and their Treatment.

FRIDAY.—10 A.M., Dr. Gardiner Hill: Endocrine Problems in the Special Departments of Medicine. 11.15 A.M., Prof. De Wesselow: Acute and Chronic Nephritis. 2 P.M., Mr. Nitch: Surgical Round with special reference to Urological Cases. (This course is open only to graduates and students of the school.)

WESTMINSTER HOSPITAL POST-GRADUATE SCHOOL.

SATURDAY, Sept. 30th.—9.30 A.M., Dr. Adolphe Abrahams: Indigestion. 10.15 A.M., Dr. W. E. Lloyd: P.U.O. 11.30 A.M., Mr. Gilbert Chubb: Earache. 12.15 P.M., Mr. Arthur Griffith: Sore Eyes. 2 P.M., Mr. E. R. Brockman: Backache. 2.45 P.M., Mr. C. Price Thomas: Acute Abdominal Pain. 4 P.M., Dr. Hildred Carlill: Fatigue. 4.45 P.M., Dr. S. E. Dore: Itching.

SUNDAY, Oct. 1st.—9.30 A.M., Dr. Donald Paterson: Anorexia in Children. 10.15 A.M., Mr. Tudor Edwards: Frequency of Micturition. 11.30 A.M., Mr. Stanford Cade: Difficulty in Swallowing. 12.15 P.M., Dr. Arnold Stott: Cough. 2 P.M., Mr. Stanley Dodd: Menorrhagia. 2.45 P.M., Mr. E. Rock Carling: Common Fractures. (This course is open only to graduates and students of the school.)

PRINCESS ELIZABETH OF YORK HOSPITAL FOR CHILDREN, Shadwell, E.

FRIDAY, Sept. 29th.—8.45 P.M., Prof. D. F. Fraser-Harris: Science and Poetry.

MANCHESTER ROYAL INFIRMARY.

TUESDAY, Sept. 26th.—4.15 P.M., Dr. W. Brockbank: Treatment of Cough.

FRIDAY.—4.15 P.M., Mr. Harry Platt: Demonstration of Orthopædic Cases.

Births, Marriages, and Deaths

BIRTHS

ANDERTON.—On Sept. 18th, in London, the wife of Captain Geoffrey Anderton, R.A.M.C., of a daughter.

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(*With the Collaboration of the Clinical Staff of Queen Charlotte's Hospital*)

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The treatment of these patients up till midsummer, 1932, was on conventional lines—by large doses of potassium citrate and ample fluids—and occasionally, in the more severe ones, by acriflavine or some other so-called urinary antiseptic. They became symptom-free and the fever subsided, but the bacilluria remained in the great majority of cases. The after-history is not well known, but in a recent investigation of 48 cases by Miss Dodds [1] one-half were found to have a sterile urine after six months.

Following the observation by Clark and Helmholz [2, 3] that cases of long-standing bacilluria would sometimes clear up in a remarkable manner on a diet rich in fats and poor in carbohydrate, we have employed a similar diet in the treatment of 54 of these cases of puerperal urinary infection during the last 12 months.

This communication records what we have learned from this experience up to date, without attempting to offer any final conclusions. There is little doubt that the ketogenic diet is a valuable therapeutic agent but there is much still to be learned about it. With more experience better results will almost certainly be obtained.

The Diet

It has been known for some years that if the body is starved of carbohydrate food the normal metabolism of fats is interfered with—the fatty acids being incompletely broken down, with the result that β-oxybutyric acid, aceto-acetic acid, and acetone (collectively spoken of as "ketones" or "ketone bodies") appear in the urine. The acidity of the urine is also considerably increased. Helmholz [4] and later Dick [5] showed that the growth of *B. coli*, which in normal urine proceeds rapidly, is very much delayed in such ketonic urine or may be entirely prevented—the organisms being killed. These inhibitory or bactericidal effects have been shown by Fuller [6] to be chiefly dependent upon the amount of β-oxybutyric acid present in the urine, plus a sufficient degree of acidity. In our patients with urinary infection the bacilluria usually terminates abruptly as soon as these conditions are obtained. The aim of the ketogenic diet, therefore, should be to induce a ketosis of this degree. In our earlier efforts to that end we gave the patients about 250 g. of fat per diem and restricted their carbohydrate intake to about 30 g. by cutting out all bread, sugar, and sugar- or flour-containing foods except milk. In some patients this proved adequate, but in many it failed to induce a satisfactory ketosis. It seemed necessary to limit the carbohydrates still further. For the past six months we have been able to get it down to a daily ration of about 10 g. by eliminating the lactose contained in milk and cream. This we do by disallowing milk and substituting for dairy cream a lactose-free "synthetic" cream (vide infra).

The present diet is made up roughly as follows and is given to all the patients in whom we wish to induce a ketosis—irrespective of their weight, unless this is quite exceptional.

Fat (250 g.).—We dispose of the fat as 150 g. in the form of cream (14 oz. of 40 per cent. cream being used per diem in soup, fruit fool, cream moulds, ice-cream, and in tea or coffee); 75 g. in 3 oz. of butter which is spread on gluten rolls and also used in making scrambled eggs; 25 g. in the form of bacon or meat fat.

Carbohydrate (10 g.).—Practically all the carbohydrate is contained in vegetables and fruit—viz., cabbage, spinach, celery, cucumber, lettuce, cress, tomatoes, gooseberries fresh or bottled, fresh rhubarb, strawberries, and cranberries when obtainable.

Protein (80 g.).—The protein, which can be cut down if desired, is given in meat, fish, eggs, gluten rolls, and St. Ivel cheese.

The chief difficulty has been the patients' dislike for so large a proportion of fat, but it can be overcome to a considerable extent by an experienced cook. Sample of an actual week's dietary is given below.

SUPPLEMENTARY NOTES ON DIET

Only *saccharine* may be used for sweetening.

The total *fluid intake* should be restricted to 2 pints in the 24 hours. Lemonade should be made with fresh lemons and saccharine. Plain soda-water is allowed.

Synthetic cream.—For making this a salt-free butter is essential. Casein solution is made up daily by dissolving 1 oz. of soluble light white casein (British Drug Houses) in 1½ pints of water, steaming in a double cooker and straining through muslin before use. To make the cream 3 oz. of this solution warmed with a little saccharine is mixed with 2 oz. of melted butter and pumped through a cream machine (Pentocreme or Empire type). Ice-cream can be made by mixture of this cream with gelatin and eggs and some flavouring such as vanilla, in an ice and salt box. *Soups* are prepared from bone and meat stock with cream but without potato or thickening. Tomato, Lemco, Marmite, or bay leaves can be used for flavouring. A helping contains 4 oz. cream.

Vegetables.—Brussel sprouts, cauliflower, or kale may replace cabbage and spinach, but not more than 3 oz. should be allowed at any one meal. White sauce mad [illegible] with flour is not allowed.

Salads.—Small amounts of olives or asparagus [illegible] her taken with salad but the total helping should [illegible] to the 2 oz. If salad dressing is used, it should [illegible] minutes with olive oil, eggs, and vinegar. If tin [illegible] are so swollen is used it should, of course, be first te[illegible] alcohol in any *form* it is practically sugar free. [illegible] times had attacks

The *rolls* used are Callard's glut[illegible] ing tinctures, even in per diem with plenty of butter. [illegible] attack after eating a [illegible] at first seemed strange, but the cake had contained brandy. In fact, I believe she would make a most delicate test for alcohol. I tested her skin susceptibility to alcohol and found a marked reaction. Also, to see if the reaction were possibly local or took place after absorption, I carefully painted a little brandy on the interior of the mouth, but no result followed.

Mrs. D, aged 65, for the past five years has been similarly susceptible to alcohol. Again, only the lips and mouth have been affected. It is interesting to note that she was sent for diagnosis to a throat specialist. Recently she had eaten some trifle containing sherry and was very surprised to find that she was afterwards symptomless, so apparently her idiosyncrasy is disappearing.

Mrs. E, aged 63, a subject of myocardial disease and an invalid, discovered shortly after eating tinned sausage that she could not speak properly, and was terrified that she had developed a stroke. She had a well-marked swelling of the lips and tongue, however, so we were able, with a fair degree of certainty, to implicate the sausage which had been a new type of food for her. She has had no recurrence within 18 months. Her daughter suffers from an intermittent swelling of the ankles, presumably angioneurotic, as there is no other condition to explain it. At times, too, she gets sudden "mists" before her eyes, lasting for a few hours and quite incapacitating. These are not associated with any refractive error.

Mrs. F, aged 48, is a very neurotic woman with many menopausal symptoms, and has known for two years that aspirin causes swelling of her mouth. During an illness she was given a cachet by her harassed and unbelieving medical adviser, being assured that it did not contain aspirin. As her mouth promptly swelled she dispensed with his services.

Mrs. G, aged 51, is again a very highly strung woman; she was given an intramuscular injection—I believe of a calcium preparation. She developed a most intense œdema of her limbs, body and mouth, with subsequent desquamation. It was her only attack. This is strange, as calcium is one of the drugs actually used in treating such œdemas.

Mrs. H, aged 54, is afflicted with hay-fever. Shortly after eating prawns in an hotel she developed an intense œdema of her body and mouth, so that she had to be unlaced. It was thought that she would die before she could be removed from the building. Shell-fish, of course, are well known as a cause of urticaria.

In some cases one cannot by observation condemn any particular food. The case of Mrs. C shows the importance of considering the ingredients of any particular article of diet. But in some such cases other means of allergy may be at work. Some patients seem to retain this susceptibility for years and possibly for life. But in others it seems to disappear spontaneously.

Mrs. K, aged 45, had frequent bouts of œdema of the body and mouth over a period of six months. In one of her attacks she developed respiratory distress and cyanosis, probably through involvement of the larynx. No cause could be found even by the most stringent dieting; change of surroundings were of no avail. The susceptibility diminished gradually, so that within six months from the onset she was well. She has had no recurrence within two years.

TREATMENT

In treatment, it is well to explain to the patient the probable origin of the condition so that she may observe if the swellings follow any particular article of food or medicine. If this be unsuccessful one may start with a simple diet, say milk, for two days, adding foods one by one and observing the effects. Incidentally I have found this a useful method of estimating dietetic possibilities of origin in asthma and associated conditions. Skin tests, such as are employed in asthma, may be tried. Personally I have not required to use them.

Any endogenous source of intoxication should also be considered; thus focal sepsis should be dealt with, and a gastro-intestinal investigation, including a test-meal, to gauge acidity, and a bacteriological examination may conceivably assist. Lavage of the colon, and intestinal antiseptics such as calomel, Salol, and Dimol may also be tried in suspected bowel infections. I have not used general desensitisation methods, such as the intravenous or intramuscular use of peptone, but they seem reasonable enough. Peptone, half a gramme before food, has been recommended.

During the attack of œdema, adrenaline, ♏ 5 to 10 subcutaneously, is the most useful drug; or a combination of pituitrin and adrenaline may be more effective. It is of especial value in controlling swelling of the mouth, and may ward off the possibility of a tracheotomy. The response to adrenaline may be as prompt as in an attack of asthma. If the mouth be affected, the patient should be warned not to talk or eat for a few hours, and ice may be given to suck. An adrenaline or ephedrine spray may be serviceable. Swellings of the skin are benefited by cold sponging or compresses. A depletive such as a concentrated dose of magnesium sulphate at the beginning of an attack may also alter its course. Œdema involving the glottis will demand constant supervision until its subsidence. Tracheotomy may be required urgently.

Calcium, quinine, arsenic, and belladonna are used more or less empirically, and results apparently due to them are sometimes obtained. It is hard to see how calcium can be useful if the blood calcium be normal, yet its occasional efficacy in urticarial conditions is undoubted. Ephedrine hydrochloride would appear a more rational drug, because of its adrenaline-like action. Personally I have found it of little service. In cases occurring at the menopause thyroid has been recommended, but I have not found it of value. Glucose and alkalis may be tried, as they seem to be of occasional benefit in allied conditions. Weekly injections of adrenaline are of possible protective value for the condition itself.

Lastly, cases unresponsive to these means may be greatly benefited by a change of residence and air.

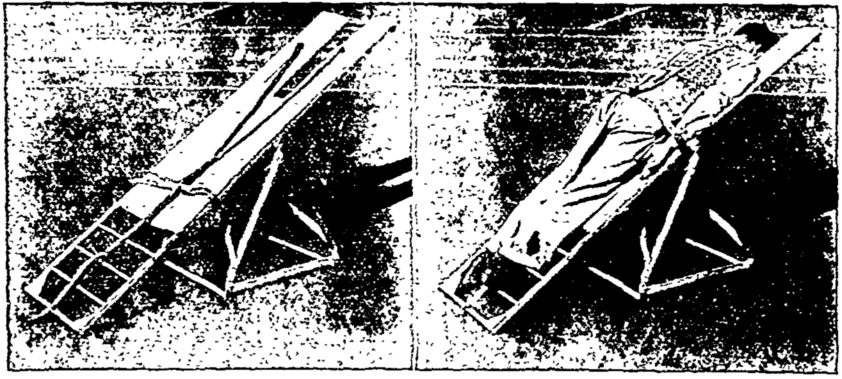
PHYSIOLOGICAL INVESTIGATION OF THE ROCKING METHOD OF ARTIFICIAL RESPIRATION

By ESTHER M. KILLICK, M.B., B.Sc. LEEDS,
M.R.C.P. LOND.
DEPARTMENT OF PHYSIOLOGY, UNIVERSITY OF LEEDS; AND

F. C. EVE, M.D. CAMB., F.R.C.P. LOND.
CONSULTING PHYSICIAN TO THE ROYAL INFIRMARY, AND
SENIOR PHYSICIAN TO THE VICTORIA HOSPITAL FOR
CHILDREN, HULL

ONE of us (F. C. E.) described in THE LANCET of Nov. 5th, 1932, a method of artificial respiration by rocking. The unconscious patient is placed face downwards on a pivoted rockable stretcher which is rocked 45 degrees up and down, a dozen times a minute. The weight of the abdominal viscera in the head-down position pushes up the diaphragm into its expiratory phase. In the feet-down position inspiration is similarly produced (see Figure).

The method has been found successful in cases of paralysis of the diaphragm and is also applicable to suspended respiration from drowning, electric shock, gas poisoning, anæsthetics, &c. Any method involving the use of apparatus of this type must be limited in its application, but within these limit the rocking method has certain advantages over the manual methods in general use. The most satisfactory manual method is undoubtedly the prone pressure method introduced by Schafer in 1904. He pointed out that it had the following advantages: (1) the physical operations are simple and do not involve great muscular exertion; (2) the gaseous exchange is efficient; (3) the prone position prevents blocking of the air passages by falling back of the tongue; (4) in cases of drowning water and mucus are readily expelled from the air passages; and (5) there is no risk of injury to the congested liver or to any other organ. Any means of artificial respiration, to be efficient, must at least possess these advantages, and we have therefore endeavoured to assess the relative efficiency of the Silvester, the Schafer, and the rocking methods.



The Riley stretcher for Eve's rocking method of artificial respiration. It is adapted for patients of different lengths by (1) a padded groove for the face; (2) slots for the shoulder straps. (The V-strap should be attached to the top rung, not as shown.) The right-hand photograph shows the patient strapped on the stretcher—prone if unconscious. A timing device permits a dozen double rocks per minute.

LUNG VENTILATION

The volume of air passing out of the lungs per minute was measured with an accurate gas meter during artificial respiration in healthy subjects. Lung ventilation by Silvester's method was found to be inadequate, the tidal air being only about 200 c.cm. Schafer's method produced a tidal air varying in different subjects from 350 to 550 c.cm. This agrees with the results of Schafer (1908) and of Burton Opitz (1922), who found a tidal air of 500 c.cm. by Schafer's and of 175 c.cm. by Silvester's method. Using the rocking method at rates approximating to the normal respiratory rate, the tidal air was 450 to 600 c.cm.

It will be seen from Table I. that the average figures for lung ventilation rise with the rate of rocking, although the tidal air diminishes slightly at the higher rate. But it does not follow that increased ventilation necessarily means a more efficient respiratory exchange. This was tested in the experiments whose results appear in Tables I. and II.

TABLE I.—*Average Figures for Ten Young Adults*

Rate of rocking (R.) per minute.	Volume of ventilation per minute (litres).	Percentage of CO_2 in expired air.	CO_2 elimination. Vol. per minute (c.cm.).
Without (R.)	7·3	3·58	249
6–8 (Rs.) ..	6·8	4·29	287
10–12 „ ..	8·7	4·20	349
14–15 „ ..	10·3	3·47	346
17 „ ..	12·3	3·30	391
20–22 „ ..	16·1	3·31	529

RESPIRATORY EXCHANGE

Expired air was collected from ten healthy subjects during artificial respiration by different rates of rocking, and also during natural breathing in the prone position. Carbon dioxide elimination remains steady till the rocking exceeds 15 per minute, but at greater frequencies the average figure shows a marked rise. The CO_2 content of the expired air steadily falls with increased rate of rocking till a minimum of 3·3 per cent. is reached. A minimum figure of this order was found for each individual, although its actual value varied.

The percentage of oxygen absorbed (Table II.), on the other hand, declines steadily as the rate of rocking increases, without showing any sign of approaching a minimum value. The total volume of oxygen absorbed at first increased and then tended to fall. These changes are reflected in the average figures for the respiratory quotient.

The subjects of Table II. were accustomed to respiratory tests, and this probably accounts for their lower respiratory volumes while breathing naturally. Further, they were probably able to inhibit their tendency to breathe naturally better than the other six subjects, thus accounting for their smaller volume of ventilation at higher rates of rocking.

The total oxygen absorption and CO_2 elimination are greater with even the slowest rocking than with normal breathing. This increased metabolism was due to the muscular effort necessary for the subject to maintain his position on this early model of the stretcher with only one strap. It may be that the angle of tilt employed (50 degrees) was unnecessarily steep; for the pulmonary ventilation produced considerably exceeded that of natural breathing, and a conscious subject can feel that the ascent and descent of the diaphragm is forcible. But in practice it seems well to be on the safe side.

TABLE II.—*Average Figures for Four Young Adults with previous Experience of Respiratory Tests*

Rate of rocking (R.) per min.	Volume of ventilation per min. (litres).	Percentage of CO_2 in expired air.	CO_2 elimination. Vol. per min. (c.cm.).	Percentage of O_2 absorbed.	O_2 absorption Vol. per min. (c.cm.).	R.Q.
Without (R.)	5·2	4·11	207	5·37	272	0·76
6–7 (Rs.) ..	5·4	4·56	241	5·88	312	0·79
10 „ ..	6·1	4·40	268	5·60	342	0·78
14–15 „ ..	6·6	4·03	263	5·11	334	0·79
20–22 „ ..	8·5	3·50	291	3·73	309	0·93

CIRCULATORY CHANGES

Blood pressure changes were recorded by the continuous method of Erlanger (1912). The pressure in the sphygmomanometer armlet was made intermediate between the systolic and diastolic pressures, and the oscillations recorded served also to count the pulse-rate.

Pulse-rate changes are seen in Table III. In the head-down position the pulse was slowed, whether respiration was natural or induced by rocking. In the feet-down position the pulse-rate was approximately the same as in the horizontal.

When the subject was moved from the horizontal to the feet-down position the blood pressure was unaltered, but in the head-down position there was an increase of 9 per cent. during natural breathing. Similar variations were observed as a result of the more frequent changes of position during rocking. Measurement of the amplitude of the pulse oscillations recorded during rocking showed that the systolic pressure was increased by about 10 per cent. while the subject was in the head-down position. For it has been shown by Erlanger (1905) that changes in the systolic blood pressure are indicated by changes in the amplitude of the pulse oscillations.

TABLE III.—*Pulse-rate*

—	Position of subject on stretcher.		
	Horizontal.	Feet down.	Head down.
Subject A	60	60	47
,, B	61	65	50
,, C	56	60	48
,, C (natural breathing) ..	49	50	42

DISCUSSION

A comparison of the tidal air induced by rocking on the stretcher with that produced by Schafer's method indicates that the rocking method is at least as effective as any of the manual methods. The rocking method has the advantage over the prone pressure method of requiring less exertion in performing the necessary movements. Artificial respiration can therefore be maintained more easily over long periods. Further, the method can be applied by an untrained operator, following simple instructions as to timing. Warmth, a factor so important and so commonly neglected, can be adequately applied.

Investigation of the circulatory changes induced by rocking show that their magnitude is not such as should be of clinical importance. As to the variations in the gaseous exchange with different rates of rocking, the figures show that at rates above 15 per minute there is a tendency to over-ventilate, and hence wash out CO_2 in amounts disproportionate to the amount of oxygen which can be absorbed. Since CO_2 is an important stimulus to the normal activity of the respiratory centre, the onset of spontaneous breathing might be delayed if its amount in the blood should be too far reduced. Since measurements of the lung ventilation show that rocking the stretcher 10 or more times a minute induces adequate ventilation, we may conclude that for most subjects the optimum rate of rocking the stretcher lies between 10 and 15 per minute—i.e., the normal rate of breathing.

In practice, of course, Schafer's method must be tried without an instant's delay, and used till the rocking stretcher with blankets and hot bottles can be brought alongside and employed if resuscitation is delayed or inadequate.

Our thanks are gratefully accorded to Prof. B. A. McSwiney for his advice and criticism. Also to Mr. W. Riley, of the Wakefield mines rescue station, and to Messrs. Siebe Gorman, of London, for their help on the practical and manufacturing sides.

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AN ELECTRICAL METHOD
FOR USE IN THE DIAGNOSIS OF DISEASES OF THE THYROID GLAND

BY M. A. B. BRAZIER, PH.D., B.Sc. LOND.
RESEARCH WORKER AT THE CENTRAL PATHOLOGICAL LABORATORY, LONDON COUNTY MENTAL HOSPITALS

IT has long been known that certain electrical properties of the body are affected by diseases of the thyroid gland. Vigouroux[1] made the observation in 1888 that the resistance of the body to a direct current is influenced by the thyroid gland. More modern work with alternating currents has followed this, and Lueg and Grassheim[2] have shown that what they term the "Kondenser-wert" of the skin varies in thyroid diseases in such a way as to be of diagnostic value. The method used by these workers was that of Gildemeister.[3]

In the present research an improved method has been developed for studying the impedance of the human body to an alternating current; this method has been published in full technical detail elsewhere,[4] together with a detailed criticism of Gildemeister's method, giving the reasons why it was not adopted for the present work.

The electrical characteristic of the human body which is under investigation in this paper is termed the "impedance angle"; a full discussion of this property, together with its mathematical derivation, will be found in the paper cited,[4] so that it is sufficient here to give a short definition of this term and to outline in brief the technique for its estimation.

In constant current work the impedance of the body can be measured by a single factor—namely, the resistance; but with alternating currents the body functions not only as a resistance but also as a condenser. The ratio of these two factors is a property of the dielectric under observation (in this case the body), and it is a function of this ratio which shows variations in thyroid disease, and which is defined as the impedance angle.

The method in brief is as follows.

The patient sits on a chair with each arm immersed to the elbow in arm-baths containing salt solution. Each arm-bath contains 10 litres of 1 per cent. NaCl at a temperature of about 25° C. It has been shown[4] that the results are unaffected by variation of the temperature of the arm-baths, by slight movements on the part of the patient, by the emotional state of the patient, or by the strength of the current passing through the body. No preparation of the patient by resting or fasting[4] is necessary, and only a very slight degree of coöperation is required. The full test is accomplished in less than ten minutes. All these factors make it an extremely convenient method of investigating out-patients.

When the arms have been immersed in the arm-baths, an alternating current sufficiently low in intensity to be imperceptible to the patient is led through him into a simple bridge circuit. The impedance offered by the patient to the current can be balanced on the bridge by adjusting a variable condenser and a variable resistance, and from these readings the impedance angle can be calculated. For the full details of this process the paper already cited[4] should be consulted.

It may be mentioned that a new form of the apparatus has now been designed which is easily portable and has the advantage of being a direct reading instrument, so that calculation is eliminated.

Study[4] of the normal subject shows that the impedance angle remains almost constant from day to day in the same individual, and normal groups give only a small standard deviation (S.D) about the mean for the impedance angle (I.A.). The values for men and for women fall into two well-defined groups, the women giving higher values*; they are thus always treated as two separate groups, the mean for each group being taken as the zero for that sex. This arbitrary system of units has proved more convenient for clinical use than the expression of the measured value of the impedance angle.

In the present work all the patients examined were women, and the results are therefore compared with the mean for normal women, which has been established[4] to be 0±2·3 (S.D.=10·1). Any variation from this mean is expressed as a *plus* or *minus difference*.

THE IMPEDANCE ANGLE IN THYROID DISEASE

In order to determine whether there is a significant departure from this mean in cases of thyroid disease, 120 patients were examined. For facility in examining the great majority of these patients I am indebted to Mr. C. A. Joll, F.R.C.S.

From a study of the results it immediately becomes clear that in thyrotoxicosis there is a very marked deviation from the normal, these cases giving very high values for the impedance angle—values which in nearly all cases are far outside the standard deviation of the normal group.

As a preliminary comparison the means for the groups of primary thyrotoxicosis and secondary thyrotoxicosis may be compared with that of the normal women and with the mean of a group of non-toxic goitres (Table I.).

From these figures it is evident that the increase in impedance angle in thyrotoxicosis is so great that even the means for these two groups are greater than twice the standard deviation of the normals. Statistically these differences are of a significance beyond all possible error of chance.

It is found that in general the severer the disease the higher the impedance angle, and in this way the impedance angle can be correlated with the basal metabolic rate. It may be noted here that the impedance angle is not dependent on the basal metabolic rate. It has been shown in another piece of research (in collaboration with Dr. F. M. Grant) that in the absence of a thyroid factor the impedance angle is independent of the B.M.R., but in all cases where the B.M.R. is raised by thyrotoxicosis, by thyroid feeding, or by thyroxine or thyroid injection, then the I.A. will also be raised. In this way the impedance angle proves a more specific test for thyroid disturbance than does the B.M.R.

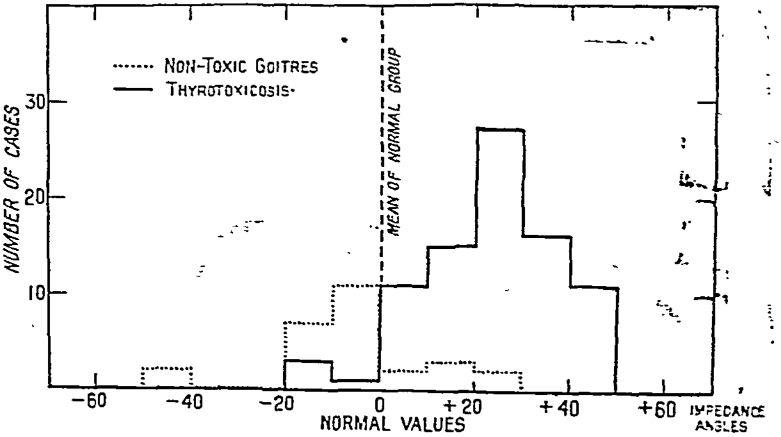

FIG. 1.—Impedance angles. Frequency distribution curves for thyrotoxicosis and non-toxic goitres.

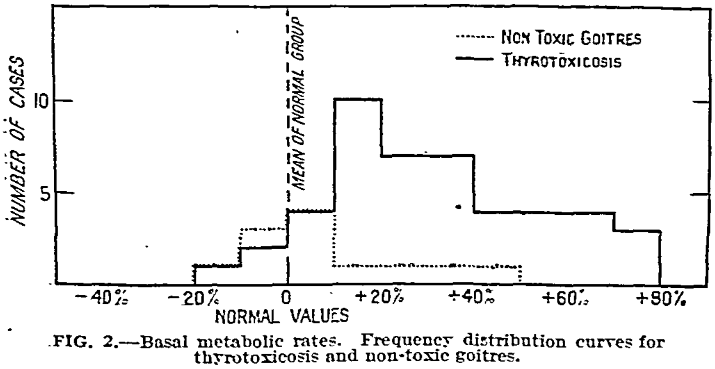

FIG. 2.—Basal metabolic rates. Frequency distribution curves for thyrotoxicosis and non-toxic goitres.

In Fig. 1 the frequency distribution curve for the impedance angles of 84 cases of thyrotoxicosis is compared with that of the 33 cases of non-toxic goitre. A striking point in Table I. is the fact that the non-toxic goitres not only fail to give increased impedance angles, but in fact give values in general lower than normal; thus the mean for this group is −9·8. This point is brought out even more clearly in the frequency distribution curves in Fig. 1.

TABLE I

No. of cases.	Diagnosis.	Mean value of impedance angle.
53	Primary thyrotoxicosis	+22·7 ±2·1. S.D.=15·6
31	Secondary ,,	+21·2 ±2·2. S.D.=12·4
33	Non-toxic goitres	−9·8 ±2·9. S.D.=17·1
20	Normal women	0 ±2·3. S.D.=10·1

This fact of the impedance angle being in general lower than normal in the case of non-toxic goitres makes this test extremely useful in the detection of early toxic symptoms. It is also of interest in view of the fact that it has been claimed by Kocher,[5] by Dodds, Lawson, and Robertson,[6] by Boothby[7] and others, that the B.M.R. of these cases is very often below normal. This was not confirmed by the B.M.R. results of the non-toxic goitre cases examined in the present research; but as there are only 11 cases where the B.M.R. was obtainable, no definite conclusion can be drawn from them. Joll[8] quotes 30 cases of colloid goitre, giving an average B.M.R. of +8·5 per cent. and 100 cases of nodular goitre with an average B.M.R. of −1·7 per cent.

The frequency distribution curves for the B.M.R.'s of 46 of the same cases of thyrotoxicosis and of 12 cases of non-toxic goitre are given in Fig. 2. It will be seen that 29 out of the 46 cases of thyrotoxicosis the feet-down position the pulse-rate was approximately the same as in the horizontal.

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* *In order to conform* with Gildemeister's practice the impedance angle used throughout this paper is formally measured with respect to the vector corresponding to a pure capacitance. It thus corresponds with the dielectric loss angle δ in the study of dielectrics. For a discussion of this convention see the paper cited.[4]

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A NOTE ON THE EFFECT OF RADIATION ON BLOOD

By G. White Phillips, M.B. Liverp.,
D.M.R.E., L.D.S.
LATE RESIDENT MEDICAL OFFICER, WESTMINSTER HOSPITAL ANNEXE

The periodical examination of the blood of all patients undergoing radiation therapy and of the more permanent members of the staff is at present a routine in most radiological centres. The investigation described below is confined to the study of blood changes in cases of malignant disease undergoing radiation therapy. The conclusions reached are based entirely on this material and do not necessarily apply to workers in radiological departments who may be exposed to small doses over a long period.

It seems to be generally acknowledged that the condition of the blood governs to a certain degree the amount of radiation that can be given. A study of the literature shows, however, that there are no blood changes which are universally regarded as being characteristic of the effects of radiation.

The effect most frequently described is the production of a leucopenia, in association with a relative and absolute lymphopenia. The production of a lymphopenia is said by some to correspond with the view that lymphocytes, like undifferentiated cells and those undergoing mitosis, or about to do so, are highly radiosensitive. Lymphopenia was described by Heineke in 1905 and confirmed recently in this country by Wright and Bulman, and by Piney and Mayneord. Lavedan, on the contrary, regards a mononucleosis as the most characteristic change due to prolonged small doses of radiation, and says that this may be so marked as to approach an inversion of the normal polynuclear and lymphocytic relations. Aubertin in 1911 found that there was usually a low white cell count following irradiation, but that the differential was variable, and that there was in some instances an eosinophilia. Jagie and his collaborators, however, had observed a diminution in the number of the eosinophils. Amundsen found that prolonged small doses produced a diminution in the number of granular cells, formed by the bone-marrow and a higher percentage than normal of lymphocytes. Galavresi, investigating the effects on the blood of large doses of radium, came to the conclusion that the most constant change was an increase in the number of the reticulated red cells. Lavedan's recent review of the literature on the questionnaire sent to 1000 radiologists shows that the consensus of opinion points to a leucopenia with a relative diminution in the number of polymorphonuclears. Among radium workers Gudzent and Halberstaedter found a relative and absolute lymphocytosis, a slight fall of total leucocytes and hæmoglobin, but no change in the red cells. Barclay and Cox, while admitting that massive doses of deep X rays do produce a definite effect on the blood, throw doubt on the occurrence of such changes in the ordinary X ray worker as a result of X rays, and say that the effects are due to the badly ventilated rooms commonly used. Mottram and Clarke have reported a diminution in both the polymorphs and lymphocytes, and a low red count with sometimes a raised colour-index. The cases of death from aplastic anæmia at the Radium Institute were also described by Mottram in 1920. Similar cases have been described by Pfahler and by Williams.

An Investigation of Malignant Cases

The foregoing brief review of some of the literature on the blood changes produced by radiation based on Sir Humphry Rolleston's critical review indicates very clearly the lack of agreement amongst different observers as to the effects of radiation on the blood. The investigation detailed below was undertaken to determine blood changes that actually occur during, and as a result of, radiation treatment of cases of malignant disease by means of radium and X rays. To this end regular counts were done on a number of cases undergoing radiation therapy. The technique adopted is detailed below.

The widely differing and contradictory accounts of the effects of radiation on the blood referred to above suggests that the various observers had no fixed standard for comparison. The standard in each case was that particular investigator's conception of a normal blood count, and any departures from that "normal" were attributed entirely to the effects of irradiation. The absence of a fixed standard normal blood count is due to the fact that the limits of normal counts are extremely wide, and that not only do the blood counts of various persons differ, but the blood counts of the same person are subject to exceedingly wide fluctuations. The considerable fluctuations of the various constituents of the blood of normal persons have been demonstrated, amongst others, by Simpson, Shaw, and Sabin. Simpson recorded wide variations between counts done even within a space of five minutes on the same person. He found the extreme range of total leucocytes to be very wide in normal people; the highest count recorded in his series was 16,300, and the lowest 2800 per c.mm., and in view of this variation he holds that considerable caution must be exercised in attributing changes to any particular factor.

In order to be in a position to assess correctly any alterations or fluctuations that might be observed in the blood counts of the patients undergoing investigation, I did a series of counts, employing the same technique, on six nurses. These nurses did not come into contact with either radium or X rays, and were chosen as likely to provide normal blood counts; they were deemed particularly suitable as controls because their diet is somewhat similar to that given to the patients. Christmas occurred in the middle of the investigations and counts were not done over the holiday.

Blood counts were done every other day on nine patients, all suffering from malignant disease. The cases were in no way selected. The blood was collected each day between 11 A.M. and noon, so as to reduce the effects of digestion to a minimum. The same two counting chambers were used throughout and the white and red cell counts done by the same observer. The blood was carefully drawn up exactly to the mark in the pipettes. The smears on the slides were made with a blood plane to ensure an even spread. The ear was chosen for obtaining the blood, and a deep enough puncture made to obtain a ready flow of blood.

The detailed results of the investigation, together with clinical details of the cases and the dose delivered in each case, will appear in the Westminster Hospital Reports (No. 22), to be published shortly.

The results of the serial blood counts on both the controls and the irradiated cases are shown on the accompanying graphs. The scale employed for plotting each constituent in the graphs is indicated at the side of each column. The percentages only of the neutrophils, lymphocytes, and monocytes are indicated.

gave B.M.R.'s above the normal range (−20 per cent. to +20 per cent.), i.e., 63 per cent. This can be compared with Fig. 1, where it is seen that 69 out of the 84 cases of thyrotoxicosis gave impedance angles above the normal limits (−10 to +10, the standard deviation of the impedance angle for normal women being 10·1), or 82 per cent. As a single clinical test, therefore, the impedance angle appears to be a more reliable aid to correct diagnosis than the B.M.R., quite apart from the advantage of its specificity.

There occurred in this series an anomalous case of primary thyrotoxicosis in which the B.M.R. was extremely low. The impedance angle was, however, above normal. In brief the details of this case were these:—

CASE A.—B.M.R.= −15 per cent. I.A.= +24. Clinical picture: sudden onset of symptoms; breathlessness, headaches, excessive sweating, exophthalmos, exhaustion, dysphagia, tremor, and tachycardia associated with rapid firm enlargement of the thyroid. Operative findings: moderately severe, fairly widespread hypertrophy and hyperplasia of the Graves's type; fibrosis moderate; lymphorrhages few and small. *Diagnosis*: primary thyrotoxicosis.

This type of case in which the B.M.R. is low in spite of every other symptom indicating a toxic condition is not really very uncommon. Troell[9] quotes 12 of his cases as giving low B.M.R.'s, all of which on operation showed the typical microscopic picture of primary thyrotoxicosis. His explanation that these low B.M.R.'s are due to remissions in the disease seems scarcely adequate. Bram[10] quotes 74 cases of untreated Graves's disease, all showing no increased basal metabolic rate. In the case detailed above the impedance angle would be a more reliable guide than the B.M.R.

The behaviour of the impedance angle in patients after partial thyroidectomy for thyrotoxicosis is also of interest. During the first few months following the operation there is a decrease of impedance angle to below the normal level and then, as the remaining portion of the gland slowly adjusts itself to the task of taking on the work of a normal thyroid, the impedance angle gradually returns to the normal level. In other words, the I.A. behaves after partial thyroidectomy in a similar way to the weight curve[11] and the basal metabolic rate curve.[11] Both these properties behave as though the operation were followed by a quite temporary post-operative myxœdema, which is soon obliterated as the gland takes on its normal function.

TABLE II

Case.	B.M.R.			Impedance angle.			Interval in months.
	Before op.	After op.	Change.	Before op.	After op.	Change.	
	Per cent.						
1	+24	—	—	+14	+ 2	−12	6
2	+16	—	—	+31	−17	−48	3
3	+23	—	—	+20	+ 6	− 4	3½
4	+77	—	—	+44	+ 2	−42	4
5	+32	−11 %	−43 %	+34	+22	−12	4½
6	+66	—	—	+29	+10	−19	5
7	+24	—	—	+ 2	−17	−19	2½
8	+31	—	—	+12	− 9	−21	3
9	+14	− 5 %	−19 %	+ 4	+ 1	− 3	3½
10	+65	—	—	+40	−11	−51	2½
11	+ 1	—	—	−11	−29	−18	3½
12	+47	—	—	+ 1	−37	−38	3
13	+51	—	—	+21	−38	−59	3
14	—	—	—	− 5	+ 1	+ 6	4½

In Table II. are given the pre- and post-operative figures for 13 cases of thyrotoxicosis and 1 case of non-toxic goitre (Case 14). It is interesting that the only case (Case 14) which showed an increase in impedance angle following partial thyroidectomy is that of the non-toxic goitre, and here the result is within normal limits both before and after the operation.

In concluding, it may be of interest in view of its comparative rarity to report the findings on a case of Riedel's disease.

CASE B.—B.M.R.= +6 per cent. I.A.=0. Clinical picture: marked exophthalmos, some tachycardia, fine tremor; bilateral firm enlargement of the thyroid, greater on the left side; one or two nodules were palpable. Operative findings: the right lobe contained two parenchymatous adenomata; widespread and well-marked infiltration with plasma cells and lymphorrhages which had broken up the acini and also collections of these cells were scattered throughout the gland; considerable fibrosis. Diagnosis: the condition is an early stage of Riedel's disease.

A single case of malignant adenoma occurred in this series, the impedance angle being found normal.

CASE C.—I.A.= −4. Clinical picture: firm localised swelling in the lower pole of the left lobe of the thyroid; dyspnœa. Operative findings: adenoma with early malignant changes.

A case of "masked hyperthyroidism" may be reported here.

CASE D.—B.M.R.= +25 per cent. I.A.= +32. Clinical picture: no visible or palpable goitre, severe tachycardia, auricular fibrillation, very slight exophthalmos, coarse tremor, some œdema of feet, loss of weight.

It is concluded from the series of results detailed above that the impedance angle forms a very reliable aid to the diagnosis of toxic conditions of the thyroid gland. In this respect it is more specific and more certain than the basal metabolic rate. The test itself is open to less experimental error than the B.M.R. estimation and is particularly adaptable to the investigation of out-patients.

This line of research is now being extended to include the study of myxœdema and cretinism.

This research was carried out with the aid of a grant from the Medical Research Council, and under the direction of Dr. F. L. Golla, to whom my thanks are due. I am especially indebted to Mr. Joll for advice and help throughout this work, and for the great majority of the cases examined. For opportunity to examine the remainder of the cases I have to thank Dr. Terence East, Dr. J. L. Livingstone, and Dr. Edward Mapother and his staff at the Maudsley Hospital.

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BELFAST HARBOUR ISOLATION BASE.—It is proposed to utilise Purdysburn Fever Hospital as alternative accommodation to the isolation base in Belfast harbour. The medical depôt at the harbour has been in existence for 25 years, but there has never been a seafaring patient in the isolation hospital. From time to time patients from the city and certain "contacts" have been treated there, but from a shipping point of view it has never been needed.

A NOTE ON THE EFFECT OF RADIATION ON BLOOD

By G. White Phillips, M.B. Liverp.,
D.M.R.E., L.D.S.

LATE RESIDENT MEDICAL OFFICER, WESTMINSTER HOSPITAL ANNEXE

The periodical examination of the blood of all patients undergoing radiation therapy and of the more permanent members of the staff is at present a routine in most radiological centres. The investigation described below is confined to the study of blood changes in cases of malignant disease undergoing radiation therapy. The conclusions reached are based entirely on this material and do not necessarily apply to workers in radiological departments who may be exposed to small doses over a long period.

It seems to be generally acknowledged that the condition of the blood governs to a certain degree the amount of radiation that can be given. A study of the literature shows, however, that there are no blood changes which are universally regarded as being characteristic of the effects of radiation.

The effect most frequently described is the production of a leucopenia, in association with a relative and absolute lymphopenia. The production of a lymphopenia is said by some to correspond with the view that lymphocytes, like undifferentiated cells and those undergoing mitosis, or about to do so, are highly radiosensitive. Lymphopenia was described by Heineke in 1905 and confirmed recently in this country by Wright and Bulman, and by Piney and Mayneord. Lavedan, on the contrary, regards a mononucleosis as the most characteristic change due to prolonged small doses of radiation, and says that this may be so marked as to approach an inversion of the normal polynuclear and lymphocytic relations. Aubertin in 1911 found that there was usually a low white cell count following irradiation, but that the differential was variable, and that there was in some instances an eosinophilia. Jagie and his collaborators, however, had observed a diminution in the number of the eosinophils. Amundsen found that prolonged small doses produced a diminution in the number of granular cells, formed by the bone-marrow and a higher percentage than normal of lymphocytes. Galavresi, investigating the effects on the blood of large doses of radium, came to the conclusion that the most constant change was an increase in the number of the reticulated red cells. Lavedan's recent review of the literature on the questionnaire sent to 1000 radiologists shows that the consensus of opinion points to a leucopenia with a relative diminution in the number of polymorphonuclears. Among radium workers Gudzent and Halberstaedter found a relative and absolute lymphocytosis, a slight fall of total leucocytes and hæmoglobin, but no change in the red cells. Barclay and Cox, while admitting that massive doses of deep X rays do produce a definite effect on the blood, throw doubt on the occurrence of such changes in the ordinary X ray worker as a result of X rays, and say that the effects are due to the badly ventilated rooms commonly used. Mottram and Clarke have reported a diminution in both the polymorphs and lymphocytes, and a low red count with sometimes a raised colour-index. The cases of death from aplastic anæmia at the Radium Institute were also described by Mottram in 1920. Similar cases have been described by Pfahler and by Williams.

An Investigation of Malignant Cases

The foregoing brief review of some of the literature on the blood changes produced by radiation based on Sir Humphry Rolleston's critical review indicates very clearly the lack of agreement amongst different observers as to the effects of radiation on the blood. The investigation detailed below was undertaken to determine blood changes that actually occur during, and as a result of, radiation treatment of cases of malignant disease by means of radium and X rays. To this end regular counts were done on a number of cases undergoing radiation therapy. The technique adopted is detailed below.

The widely differing and contradictory accounts of the effects of radiation on the blood referred to above suggests that the various observers had no fixed standard for comparison. The standard in each case was that particular investigator's conception of a normal blood count, and any departures from that "normal" were attributed entirely to the effects of irradiation. The absence of a fixed standard normal blood count is due to the fact that the limits of normal counts are extremely wide, and that not only do the blood counts of various persons differ, but the blood counts of the same person are subject to exceedingly wide fluctuations. The considerable fluctuations of the various constituents of the blood of normal persons have been demonstrated, amongst others, by Simpson, Shaw, and Sabin. Simpson recorded wide variations between counts done even within a space of five minutes on the same person. He found the extreme range of total leucocytes to be very wide in normal people; the highest count recorded in his series was 16,300, and the lowest 2800 per c.mm., and in view of this variation he holds that considerable caution must be exercised in attributing changes to any particular factor.

In order to be in a position to assess correctly any alterations or fluctuations that might be observed in the blood counts of the patients undergoing investigation, I did a series of counts, employing the same technique, on six nurses. These nurses did not come into contact with either radium or X rays, and were chosen as likely to provide normal blood counts; they were deemed particularly suitable as controls because their diet is somewhat similar to that given to the patients. Christmas occurred in the middle of the investigations and counts were not done over the holiday.

Blood counts were done every other day on nine patients, all suffering from malignant disease. The cases were in no way selected. The blood was collected each day between 11 A.M. and noon, so as to reduce the effects of digestion to a minimum. The same two counting chambers were used throughout and the white and red cell counts done by the same observer. The blood was carefully drawn up exactly to the mark in the pipettes. The smears on the slides were made with a blood plane to ensure an even spread. The ear was chosen for obtaining the blood, and a deep enough puncture made to obtain a ready flow of blood.

The detailed results of the investigation, together with clinical details of the cases and the dose delivered in each case, will appear in the Westminster Hospital Reports (No. 22), to be published shortly.

The results of the serial blood counts on both the controls and the irradiated cases are shown on the accompanying graphs. The scale employed for plotting each constituent in the graphs is indicated at the side of each column. The percentages only of the neutrophils, lymphocytes, and monocytes are indicated.

RESULTS

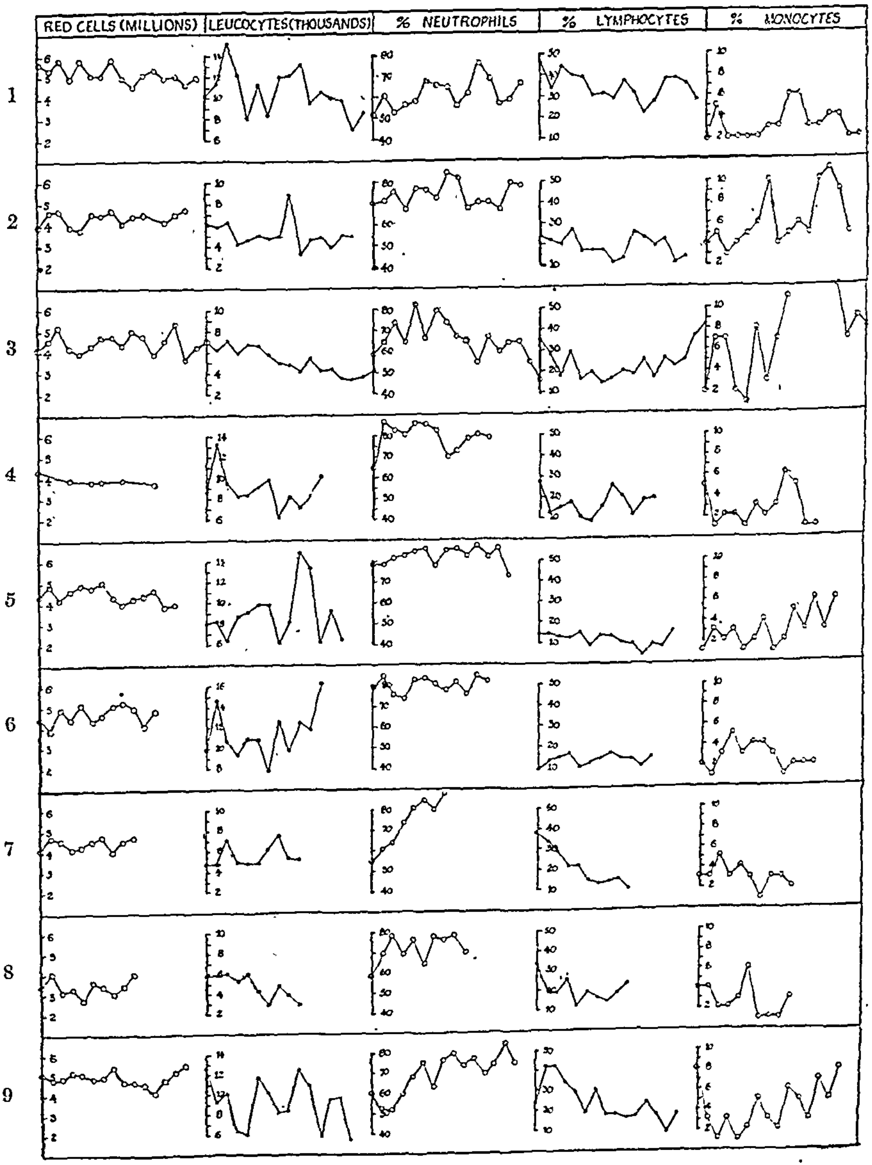
The wide fluctuations to which the cellular constituents of blood normally are subject are well demonstrated by the series of regular blood counts. It is obvious from Graphs I. and II. that conclusions based on individual counts made at the beginning and at the end of treatment must inevitably be erroneous. Also the difficulty of determining slight blood changes that may result from small doses of radiation in X ray and radium workers by periodic examination of the blood at long intervals becomes apparent.

The *total dosage of irradiation used in each case* is set out in the following Table.

Examination of the blood counts in the irradiated series in comparison with those of the controls shows that no change has been produced which is *common* to them all. The various constituents of the blood counts in the irradiated series are compared below with those in the controls.

Case.	Disease.	Dosage.		Period.
		Radium.	X rays.	
		mg. hrs.	% U.S.D.	Days.
1	Sarcoma of tibia.	86,000 (2 g.).	200	27
2	Carc. of larynx.	42,000 (2 g.).		26
3	Carc. of breast.	22,313 (S. & I.).		19
4	Lymphosarc. of mediastinum.	10,324 (S.).	270	22
5	Carc. of larynx.	48,000 (2 g.).		18
6	Mult. secondaries in bone following carc. of breast.	48,000 (2 g.).	160	15
7	Carc. of stomach.	38,000 (2 g.).		18
8	Recurrence in pelvis following carc. of stomach.	38,000 (2 g.).	400	20
9	Sarcoma of femur.	96,000 (2 g.).	540	26

U.S.D. = unit skin dose; 2 g. = 2 gramme bomb; S. = surface irradiation by means of a plaque; I. = interstitial needling.



GRAPH I.—Differential blood counts on nine cases of malignant disease under treatment by irradiation. The counts charted were made on alternate days.

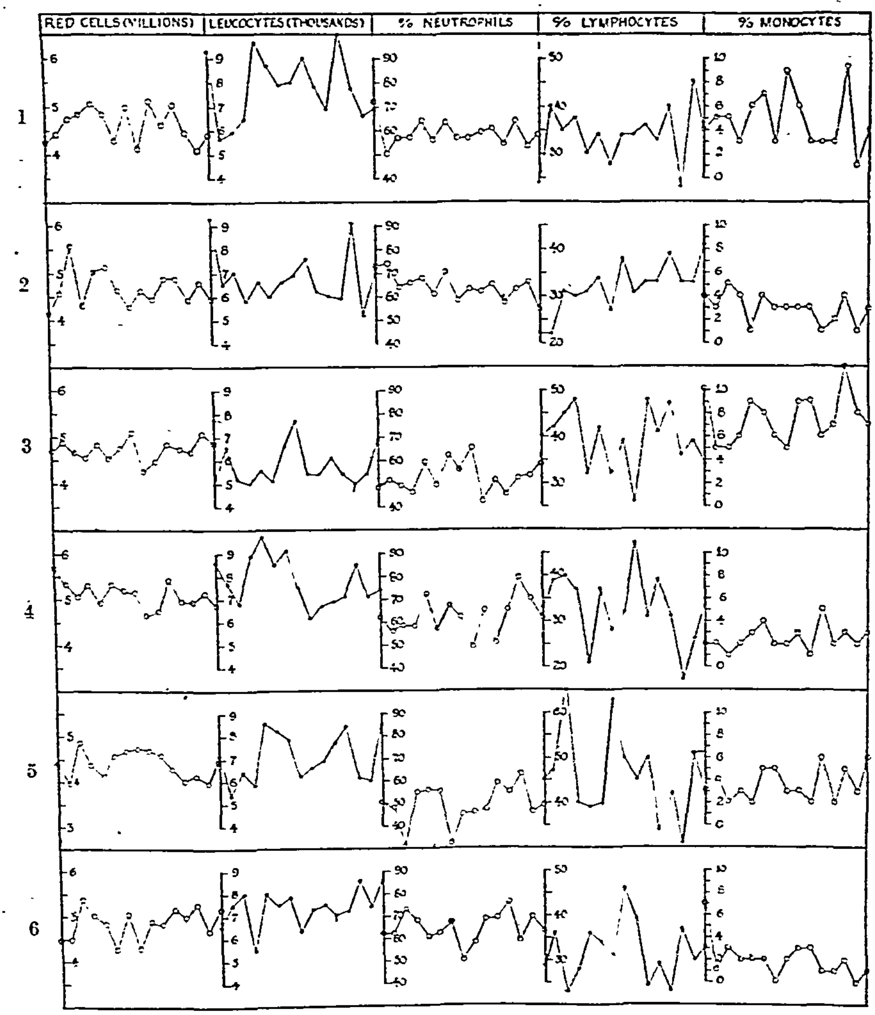
Red cells.—No marked difference between cases undergoing irradiation and the controls. The greatest fluctuation in the control series is 1,010,000, and in the irradiated series 1,290,000. These limits of variation are sufficiently close to be within the limits of experimental error.

Hæmoglobin and colour-index.—The normal series exhibited a variation of 30 per cent. and the irradiated cases a variation of 38 per cent. The difference is negligible in a method that consists of a visual estimation of colour. The colour-indices in the irradiated series show no difference from those in the controls. It is interesting to note that in Case 8, although a considerable degree of anæmia was present at the commencement of treatment, the condition was not aggravated after a large dose of irradiation.

Leucocytes. — A general examination of the graphs shows that the white cells of the blood in the irradiated series have undergone, in the main, greater individual variation than those in the control series. No changes in the irradiated series are seen, however, which can be regarded as being common to all. A slight gradual drop is seen in Cases 3 and 8. In Case 3, however, the end of the curve in the graph suggests the commencement of a rise. Also the extent of the variation is only 3700, which is well within the limits of variation in the controls of 4400. In Case 8 the entire variation is 3100. The remaining cases show variations in no way differing from those in the controls. It is of interest to note that the extreme limits of the counts in the irradiated series correspond with the normal limits quoted by Simpson.

Neutrophils.—These follow, roughly, the total white cells, showing again a slightly greater variation than those in the control series. In Case 7 a rise in the actual and relative numbers has occurred. The rise in the actual numbers is 1932, and in the percentages 33. The limits of variation as expressed by the controls are 4140 and 32 per cent. respectively. No gross departures from the normal are seen.

Lymphocytes.—When compared with those in the controls, the lymphocytes in the irradiated series are found to be generally lower. The average percentage in the controls is 36, while that in irradiated cases is 20. The lymphocytes in some of the controls are relatively very high, and in one case they have actually exceeded the neutrophils on two occasions. This has been previously described by Shaw. Phillips reports that in cases of human cancer a blood lymphocytosis is unknown. The low lymphocyte counts in all the cases in the irradiated series rather suggests that, in cases of malignant disease, a low lymphocyte count is not uncommon. The lymphocytes in both series show considerable variation, and this is more marked in the controls. In no case has a lymphopenia been produced, and although, in one or two cases, a gradual decrease is seen, the variation is well within normal limits.



GRAPH II.—Differential blood counts on six control cases. The counts charted were made on alternate days.

Monocytes.—With the exception of Case 3, no departure from normal is seen. In this case a rise to 18 per cent. in the differential count occurred, but as this was found in one case and on only one occasion it is difficult to attribute this to the effects of radiation.

Eosinophils.—These show considerable variation, and in most cases do not differ from the normal. In the irradiated series, Cases 6, 7, 8, and 9 show, on one or two occasions, a higher percentage of eosinophils than are seen in the controls. The occurrence of eosinophilia is, however, common in cases of malignant disease. In no case was eosinophilia produced.

Basophils.—No departures from the normal are seen.

Conclusions

(1) In no case, following massive doses of radiation, was there an anæmia produced.

(2) The white cells were not materially altered in any way, and a leucopenia did not occur.

(3) A low lymphocyte count was found in most of the cases of malignant disease, but the effect of the large doses used was very definitely not the production of a lymphopenia.

(4) The results of the investigation suggest, therefore, that no *characteristic* changes are produced in the blood picture by large doses of radiation; also that the blood count per se should not limit the amount of irradiation that it is considered necessary to give.

My thanks are due to the members of the honorary staff of Westminster Hospital for allowing me to use their cases for this investigation, and also to Mr. F. E. Windley, laboratory assistant at Westminster Hospital Annexe, for his loyal assistance.

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OBSERVATIONS ON THE SERUM TREATMENT OF TYPE I. LOBAR PNEUMONIA

By Duncan Leys, M.D. Oxf.
PHYSICIAN, SELLY OAK HOSPITAL, BIRMINGHAM

The account which follows gives a brief description of the results that have been obtained by treating 15 patients with a concentrated antipneumococcus serum (Type I.). The work was carried out in Selly Oak Hospital, Birmingham, and most of the cases came under observation during the winter of 1932–33.

The alternate-case method was adopted in order to afford as strict a control series as possible, and age-limits of 20 and 60 years were chosen so that the relatively benign course of pneumonia in adolescence, and the difficulty of clear-cut diagnosis in old age might not tend to obscure the significance of the results. With the exception of two or three patients early in the series none was included in it whose arrival at hospital was delayed until after the end of the third day from the onset of the attack. Apart from these exclusions no case selection was practised; all patients were included in the series whatever their condition, provided that the criteria of diagnosis were fulfilled—namely, an illness with an acute onset, the recovery of Type I. pneumococcus from the blood or sputum, consolidation of the lung, which resolved, typical rusty sputum, and characteristic autopsy findings if death ensued.

Of the first 100 cases in which these conditions were fulfilled 32 proved to be infected with Type I. pneumococcus. Two of these patients were excluded from the series since it was not possible to begin serum treatment within the prescribed limit of time, and thus 30 cases remained, of which 15 were treated with serum and 15 served as controls. The type-incidence, the fatality-rate, and other details concerning the group of 100 cases are given in Table I. The routine treatment remained in the hands of the physician to whose wards the patients were admitted, and consisted chiefly in extra fluid by mouth or rectum, local applications for relief of pleuritic pain, sedatives, and oxygen by nasal catheter.

Table I.—*Showing the Type-incidence, Fatality-rate, and other Details in 100 Consecutive Cases of Lobar Pneumonia*

—	Cases.	Men.	Women.	Died.				Average duration of fever (b).	Age-groups.				Empyema (d).
				M.	F.	Total.	Per cent.		20–30	30–40	40–50	50–60	
Type I. ..	32	23	9	7	0	7	21·8	7(a)	12	9	9	2	3
„ II. ..	23	18	5	6	0	6	26·0	10	10	3	7	3	2
„ III. ..	3	3	0	1	0	1	33·3	7	0	2	0	1	0
Group IV. ..	42	31	11	7	4	11	26·2	7·5	8	13	12	9	4
Total ..	100	75	25	21	4	25	25·0 (c)	..	30	27	28	15	9

(a) Control cases only. (b) Reckoned as number of days from onset until no rise of temperature above 99° F. was registered. (c) Mortality-rate for men is 28·0 per cent.; for women, 16·0 per cent. (d) Streptococcus cultured in two Group IV. cases, one Type II. case; pneumococcus cultured from all others.

The concentrated serum used in this inquiry was prepared in the serum department of the Lister Institute, Elstree. Dr. G. F. Petrie informs me that at the time of its preparation it was estimated to contain 1000 Felton "units" per c.cm., but that later, when a test was carried out in comparison with the British dry standard preparation, it was found to contain 500 British provisional units per c.cm.; full details of this unit are given in a recent paper (Hartley, Parish, Petrie, and Wilson Smith [1]). A dry, stable, standard serum (Type I.), of which a definite weight represents one British provisional unit, has been prepared in the department of biological standards of the National Institute for Medical Research, London, where it is maintained under optimum conditions of storage and is available for the titration of Type I. sera. The general acceptance of this unit will facilitate a more precise comparison than has hitherto been possible between scales of dosage employed by clinical observers. It is believed that the following account of the treatment of patients with antipneumococcus serum (Type I.) is the first in which the doses employed are expressed in terms of the British provisional unit. It would obviate confusion if, in reports on clinical trials of serum, the unit in terms of which dosage is expressed were clearly stated.

DETERMINATION OF TYPE

This was carried out as soon as practicable after admission to hospital by the intraperitoneal inoculation of a broth suspension of sputum into mice. The method of direct typing of unstained cocci in sputum as described by Armstrong and Johnson,[2] in which reliance is placed upon swelling of the capsule (the Neufeld reaction), and modifications of it in which stains are employed with either wet or dry preparations, did not give sufficiently clear and consistent results. A recent publication by Sabin [3] indicates that the use of a type-serum from the rabbit is to be preferred to a serum obtained from the horse; in his experience the immediate method of typing is invariably successful when this and other modifications in the technique are employed.

BLOOD CULTURES

The aim has been to obtain a blood culture from all the patients on five consecutive days after admission, but for various reasons this was not accomplished in every case. A single tube of 20 c.cm. of broth was used, 10 c.cm. of blood was added to it, and no culture was regarded as sterile until it had been incubated for three days. All positive cultures were typed as a check upon the examination of the sputum; organisms other than Type I. pneumococcus were not found.

Table II. gives the results of the cultures in both the serum-treated cases and the controls. All the patients who yielded positive cultures after the end of the fourth day of their illness died; this experience is in accordance with the generally accepted opinion that when a bacteriæmia is found late in the course of the disease death usually follows. Type I. pneumococcus was cultivated from the blood on one or more occasions during the first five days after admission to hospital in 10 of the 30 cases; of these, 5 died. Two patients died in the group of 20 who did not give positive cultures—a 10 per cent. mortality-rate. As it happened, both of these had received serum; in one there was a combined infection with the pneumococcus and the influenza bacillus, and the other died of hyperpyrexia a few hours after receiving a dose of serum. The third case in the group of serum-treated cases showed an apparent sterilisation of the blood for 24 hours after the beginning of treatment, but positive cultures were obtained each day subsequently up to the time of death. Two control patients with pneumococci in the blood as late as the fourth day of the disease subsequently recovered, and thus it cannot be concluded that the serum was *responsible for sterilisation of the blood in* Cases 5 and 13 (see Table II.).

TABLE II.—*Showing Results of Blood Cultures and Dosage of Serum*

—	Case No.	Day of disease.								Total number of British units given.	Result.
		1	2	3	4	5	6	7	8		
Serum-treated cases.	1	..	..	●	●	●	..	..	..	75,000	Died on 6th day.
	2	..	..	○	○	○	..	..	..	37,500	Recovered.
	3	..	..	●	○	●	●	●	..	187,500	Died on 8th day.
	4	..	○	○	○	○	○	..	..	37,500	Recovered.
	5	..	..	●	○	○	○	○	..	75,000	,,
	6	..	..	..	○	○	○	○	○	35,000	,,
	7	○	○	○	○	○	..	..	..	40,000	Died on 21st day.
	8	..	..	○	○	○	..	..	..	40,000	Recovered.
	9	..	○	○	○	..	..	..	..	40,000	,,
	10	..	..	..	○	..	..	..	..	40,000	,,
	11	..	○	○	○	○	○	..	..	40,000	,,
	12	..	○	○	○	○	..	..	..	40,000	,,
	13	..	..	●	●	○	○	..	..	75,000	,,
	14	..	..	○	○	○	○	○	..	40,000	,,
	15	..	○	..	..	..	..	..	..	40,000	*Died on 3rd day.*
Controls.	1	..	●	●	●	●	●	..	..	—	Died on 8th day.
	2	..	..	..	..	○	○	..	..	—	Recovered.
	3	..	..	..	○	..	○	..	..	—	,,
	4	..	○	..	○	○	..	..	..	—	,,
	5	..	●	●	●	●	●	..	..	—	Died on 8th day.
	6	..	..	○	○	○	○	○	..	—	Recovered.
	7	..	..	○	○	○	○	..	..	—	,,
	8	..	..	●	○	○	..	..	..	—	,,
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	13	..	..	●	●	○	○	..	..	—	,,
	14	..	..	○	○	○	○	..	..	—	,,
	15	..	●	●	..	..	..	..	..	—	Died on 4th day.

● indicates culture of Type I. pneumococcus; ○ indicates sterile culture.

Serum cases.—No. 5. Empyema (Type I. pneumococcus). No. 7. Pneumococcus and *Bacillus influenzæ* in peritoneum of mouse after sputum inoculation. No. 13. Empyema (Type I. pneumococcus). No. 15. Hyperpyrexia.

Control cases.—No. 13. Empyema (Type I. pneumococcus).

DOSAGE OF THE SERUM

The serum was diluted with an equal quantity of normal saline and was given solely by the intravenous route; in most cases the whole dose was given at one injection, the administration taking 15 to 20 minutes. A Jubé syringe provided a convenient means of injecting the relatively large quantity of fluid.

In the absence of any criterion as to severity of infection or lack of resistance that is at once reliable and easily applied, an empirical dosage was decided upon of 75 c.cm. (37,500 units) for all cases, with a further dose of this amount for bacteriæmic cases (Table II.). The practice of repeating the dose each day on which the blood was found to contain pneumococci was soon abandoned, since the results of continued treatment in bacteriæmic cases did not appear to be satisfactory.

Cowan and his colleagues at the Glasgow Royal Infirmary [4] used considerably smaller doses of serum than those employed in this series. Dr. R. L. Cecil,[5] reviewing his experience in the Bellevue Hospital, New York, at the annual meeting of the British Medical Association in 1932, recommended doses of 20,000 Felton "units" at intervals of two hours up to a total of 100,000 "units" or more. It may be pointed out, however, that variations in the method of titration of the serum in the United States render difficult an exact comparison of the "units" of protective antibody in the doses that are employed by different workers.

RESULTS OF THE TREATMENT WITH SERUM

In almost all cases some reaction was noted within a few minutes from the beginning of the injection, that is, when 5 to 10 c.cm. of the serum had entered the vein; this consisted in an increased pulse-rate and respiratory rate, and lasted for a few minutes only, but was sometimes rather distressing to the patient. In most cases from one to three hours later there was a rigor, with or without an initial rise of temperature, and this was followed by profuse sweating, a *rapid fall in the temperature, respiration-* and pulse-rates, and restful sleep. The sequence of events gave the impression of an induced crisis, and subsequently convalescence took place as in the natural course of a favourable case.

Four of the 15 serum-treated patients died. The treatment of two of them was not begun until the fourth day of the disease; both were bacteriæmic; the first received in all 75,000 units (150 c.cm.) and the second 187,500 units (375 c.cm.). In the third fatal case sputum typing was done on three occasions, and each time a combined growth of pneumococcus and the influenza bacillus was obtained from the peritoneal cavity of the mouse; this patient gave a history of five previous attacks of pneumonia, the last having occurred three years before. The fourth patient died with hyperpyrexia a few hours after serum had been given; a note on this case will be found below.

Composite *temperature, pulse, and respiration data* for the patients who recovered are shown in the Chart; these were obtained by taking an average of the morning and evening records; 3 of the 15 control patients died, so that the charts refer to 11 serum-treated cases and 12 controls. The accelerated fall that is apparent in the graph of the serum-treated cases reflects the rapid clinical improvement. It is noteworthy that the average degree of toxæmia as measured by the temperature and the pulse- and respiration-rates was considerably greater, on admission to hospital, among the serum-treated cases than among the controls.

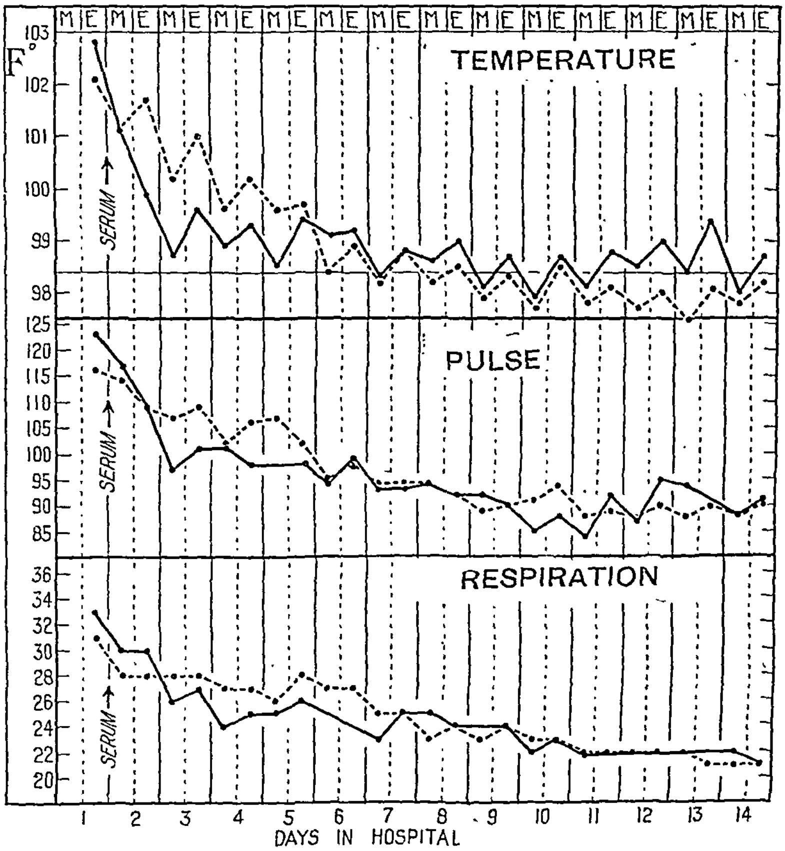
Empyema *complicated the illness of two of the* serum-treated cases and one of the controls. Type I. pneumococcus was recovered from the pus in each case.

The average interval between admission to hospital and the beginning of serum treatment was 16 hours; this could have been considerably reduced if more time had been available for the work.

SERUM REACTIONS

Hyperpyrexia has been described as an occasional complication of the use of antipneumococcus serum, and has been considered to be due to a "chill-producing" principle in the serum. One patient in this series registered a temperature of 106·5° F. shortly after he had received a dose of serum, and a second patient died with hyperpyrexia. The latter was a man of 39 years of age and was treated within 36 hours from the onset of a first attack; he had a good medical history. A blood culture taken on admission to hospital *proved to be sterile*. There was a mild immediate reaction to the serum and an hour later a slight rigor, followed by sweating, great relief of the symptoms, and sleep. Two hours later (3 A.M.) it was noticed that he was breathing stertorously, and he was found to be unconscious; his temperature was then 108° F. and five minutes later 110° F. After ice-cold sponging the temperature fell to 106° F. and the pulse pressure, then almost imperceptible, was raised by the use of pituitrin. Shortly afterwards respiration failed entirely, and then heart action; intracardiac adrenaline failed to induce any further contraction. Except for the lung, which was in the stage of red hepatisation, none of the organs, including the brain, when examined post mortem, showed any gross disease.

At the present time views as to the nature of the reactions observed after the intravenous administration of horse serum can only be speculative. There appear to be four possible factors: (1) allergy, (2) anaphylaxis, (3) the presence of some substance in the serum which disturbs the heat regulation of the body; and (4) changes produced as a result of the interaction between the pneumococcal antigen and antibody when antipneumococcus serum has been given. The pathogenesis of the extreme type of thermal reaction resulting in hyperpyrexia is equally obscure, and in this connexion it is important to note that patients may react with a severe hyperpyrexia after the intravenous injection of a variety of non-specific substances, for example, bacterial protein.



Thermal reactions have been experienced with sera other than antipneumococcal. Banks and Mackenzie,[6] describing the very satisfactory results of treatment of scarlatina by intravenous antitoxin, found heat reactions frequent.

All the patients at Selly Oak Hospital who received serum were treated with the same batch, and although
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give rise to reactions more frequently than others, it seems clear that a given batch does not invariably produce them; in other words, there certainly exists some preformed condition in a patient who suffers the reaction which helps to produce it. The nature of the symptoms and the duration of the interval between injection of the serum and their appearance exclude anaphylactic phenomena, and it is unlikely that tests for hypersensitivity will guard against thermal reactions. Common clinical experience indicates that a temperature of 103° or 104°F. in pneumonia is, ceteris paribus, a favourable sign and a precritical rise of temperature is not infrequent. The very constant association of pyrexia with non-fatal infections, whether general or local, suggests that the rise of temperature is part of a protective response; its causation is bound up with the interaction of infecting organism and infected tissue, and it is almost certainly produced through the central nervous system. It is at least possible that *thermal reactions* following the use of immune sera are of the same nature as the spontaneous febrile response of a healthy person to infection, and that in some persons the sudden interaction of infecting organism with antibody artificially introduced is responsible for an "overshooting" of what is usually a beneficial reaction.

CUSSION

When compa rtality-rates are compiled
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highly potent instrument for shortening the period of acute illness in lobar pneumonia.

One of the most important problems for the future is the control and ultimate suppression of the pyrexial reactions. I am inclined to think that the administration of divided doses may be safer than a large single dose; this method would possess the advantage of obviating the need for the employment of a special injection apparatus.

The work of Francis [7] holds out the promise that the presence or absence of a cutaneous reaction to type-specific capsular polysaccharide in a patient with pneumonia will prove valuable as a guide to prognosis and to the necessity for giving further doses of serum. In his experience a positive test in Type I. cases was almost always an index of recovery; on the other hand, six out of seven patients who yielded a persistently negative test died. Francis found that agglutinins may be present in the serum of a patient who has given a negative cutaneous test; such cases proved fatal. These observations await confirmation, and meanwhile repeated blood culture undoubtedly forms the most trustworthy method of estimating the prognosis. The shrewdest clinical judgment is often falsified by the course of the illness. Blood cultures, however, require at least 12 hours' incubation, and persistently negative cultures do not always signify recovery.

SUMMARY

An account has been given of observations on 30 patients with Type I. pneumonia, between the ages of 20 and 60 years, of whom 15 were treated with a concentrated serum which contained 500 British provisional units per cubic centimetre. The average number of units in the first dose of serum administered to the patients who recovered was 37,500, and this amount was given to them at a mean interval of three days after the onset of illness. The clinical evidence confirms the view of other workers that antipneumococcus serum (Type I.) is a highly valuable remedy in the treatment of pneumonia.

My thanks are due to the governing body and the director of the Lister Institute for providing the serum employed in the trial series; to Dr. G. F. Petrie, Dr. W. T. J. Morgan, and Dr. D. McClean, of the serum department of the Lister Institute, for giving me the constant benefit of their advice; and to my colleagues at Selly Oak Hospital, and in particular Dr. Sybil Robinson, pathologist to the hospital, for their coöperation.

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OTITIC HYDROCEPHALUS

BY HUGH G. GARLAND, M.D. LEEDS, M.R.C.P. LOND.
HONORARY PHYSICIAN, LEEDS PUBLIC DISPENSARY; AND
GEORGE S. SEED, M.B. LEEDS, D.L.O.
RESIDENT AURAL OFFICER, LEEDS GENERAL INFIRMARY

THE intracranial complications of otitis media comprise many clinical and pathological conditions and amongst these is a well-defined syndrome for which the name otitic hydrocephalus was first suggested by Symonds [4] in 1931. This group does not include cerebral abscess or purulent meningitis, but undoubtedly covers many cases hitherto labelled pseudo-brain abscess and serous meningitis. We consider, with Symonds, that this condition can usually be diagnosed on clinical grounds, and it is of considerable importance on account of the response to simple therapeutic measures.

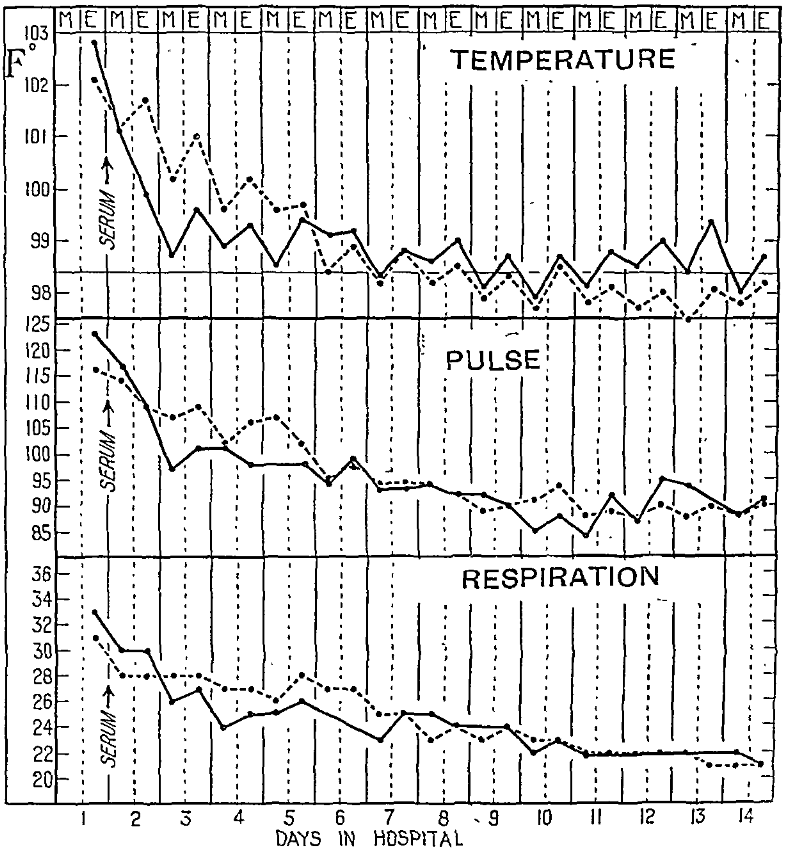
The clinical manifestations of otitic hydrocephalus are as follows. It is almost confined to children and young adults, and it may complicate acute or chronic otitis media. Headache is common, and may be severe or slight; papillœdema is constant, but vomiting and nausea are variable. The mental state is usually clear, but dullness may occur with the higher grades of papillœdema. The cerebro-spinal fluid (C.S.F.) is under high pressure and of large volume but is otherwise normal. The condition usually clears up after weeks or months as a result of drainage by repeated lumbar puncture, but if this is not carried out optic atrophy may ensue.

We have summarised the findings in ten case reports, including our own—namely, those of Symonds,[4 5] Mygind [3] (cases 2 and 3), and Cairns.[1] There were four males and six females, the average age being 13 (extremes of 5 and 26). Otitis media was right-sided in six and left in four. Headache occurred in all cases, in four being very severe. Vomiting was noted five times and giddiness twice. There was drowsiness in four cases, though in two of these the headache was not excessive. There were single examples of rigor and of epistaxis. An initial pyrexia of 100° F. was seen in all cases, in one reaching 104° F., but by the time the intracranial complications were manifest the temperature was normal. The physical signs noted included sixth nerve palsy, four cases (two contralateral); diminished abdominal reflexes, two cases (both contralateral); Kernig's sign, head retraction, and nystagmus, two cases of each; and single examples of absent knee-jerks, facial weakness (contralateral), unequal pupils, and extensor responses. Papillœdema was a constant feature, bilateral but not always symmetrical, the average height of the swelling being four to five dioptres. The otitis media was preceded by tonsillitis in two cases, was acute in six, and chronic in four. Every patient showed mastoiditis, although in two there was increased vascularity of bone only; in five there was lateral sinus thrombosis (four right-sided) and in one an extradural abscess. The cerebro-spinal fluid pressure reached a high level whenever it was recorded, always over 300 mm. and in one case 950 mm. The fluid showed normal cell and protein contents, except in two cases where an increase of cells was seen during the early stages of the illness. The fluid was usually excessive. All the cases recovered, but one was followed by optic atrophy and blindness (Cairns [1]).

The following is a typical example of otitic hydrocephalus seen by us.

CASE 1.—A girl, aged 12, had an attack of acute tonsillitis in October, 1932, with severe constitutional disturbances, but the condition of the throat cleared up in a few days; the temperature, however, remained high and she developed pain in the right ear which radiated towards the vertex and was associated with tenderness below the ear. This condition continued during the next two weeks although the throat was now quite clear. There were no rigors, but the patient became increasingly ill, and about the end of the third week she had several attacks of profuse epistaxis; she was very constipated and complained of generalised abdominal pain and tenderness. She was admitted to the Leeds General Infirmary on Nov. 5th. The temperature was still 102° F. The right tympanic membrane appeared sodden and opaque then heart action; intracardiac adrenaline failed to induce any further contraction. Except for the lung, which was in the stage of red hepatisation, none of the organs, including the brain, when examined post mortem, showed any gross disease.

At the present time views as to the nature of the reactions observed after the intravenous administration of horse serum can only be speculative. There appear to be four possible factors: (1) allergy, (2) anaphylaxis, (3) the presence of some substance in the serum which disturbs the heat regulation of the body; and (4) changes produced as a result of the interaction between the pneumococcal antigen and antibody when antipneumococcus serum has been given. The pathogenesis of the extreme type of thermal reaction resulting in hyperpyrexia is equally obscure, and in this connexion it is important to note that patients may react with a severe hyperpyrexia after the intravenous injection of a variety of non-specific substances, for example, bacterial protein.



Thermal reactions have been experienced with sera other than antipneumococcal. Banks and Mackenzie,[6] describing the very satisfactory results of treatment of scarlatina by intravenous antitoxin, found heat reactions frequent.

All the patients at Selly Oak Hospital who received serum were treated with the same batch, and although a rigor was an almost constant sequel, a rise of temperature was absent in some cases and negligible in others; one patient received 150 c.cm. of the serum at the first injection and had only a mild reaction. The constancy with which the immediate reaction and the subsequent rigor were observed makes it unlikely that these were anaphylactic in origin, for it cannot be supposed that the tissues of every patient were sensitised to horse serum protein. Sensitivity tests were not employed in this series, but preliminary subcutaneous injections of 1 c.cm. of horse serum were given to the first few cases without the occurrence of any reaction; these patients subsequently showed typical reactions after they received the intravenous dose. Late serum reactions such as fever, joint pains, and erythematous eruptions were not seen in any of the cases.

Whether or no some preparations of the serum give rise to reactions more frequently than others, it seems clear that a given batch does not invariably produce them; in other words, there certainly exists some preformed condition in a patient who suffers the reaction which helps to produce it. The nature of the symptoms and the duration of the interval between injection of the serum and their appearance exclude anaphylactic phenomena, and it is unlikely that tests for hypersensitivity will guard against thermal reactions. Common clinical experience
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She vomited occasionally. Lumbar puncture was carried out 35 times and a summary of the findings is given in the Table. The C.S.F. pressure was always more than 300 mm. except at the end of March, when it became subnormal, but on April 11th it was 170 mm.; large quantities of fluid (up to 60 c.cm.) were run off at each puncture, but towards the end of March the quantity became steadily less. Cultures of the fluid were repeatedly sterile and on no occasion were tubercle bacilli seen.

Throughout the illness the child was coöperative and alert, and after six weeks was running about the ward. During the earlier stages of the illness lumbar puncture was followed by intense headache. There was no evidence of lateral sinus thrombosis, and the C.S.F. pressure was increased by compression of either jugular vein. An unexpected complication arose on March 10th, when the C.S.F. Wassermann reaction was reported to be slightly positive. We are, however, inclined to disregard this for the following reasons: subsequent examinations have shown a negative reaction, the blood Wassermann reaction is negative, the mother's reaction is negative, and the child shows no stigmata of congenital syphilis, nor is there any history of infection in the parents.

This is clearly a case of benign otogenic meningitis and it is equally clearly a case of hydrocephalus. When she was first seen the patient presented the features of otitic hydrocephalus in which there had been a preliminary mild meningitis, but later she developed a more severe meningeal reaction with many polymorphonuclear leucocytes in the fluid.

PATHOLOGY

The pathology of otitic hydrocephalus is obscure. It has been thought by some to result from oversecretion on the part of the choroid plexuses. Others consider it to be due to blocking of the interventricular foramina by a meningitic process; this theory, however, fails to account for the large quantities of C.S.F. which are obtained at lumbar puncture, although it may explain those cases which require ventricular puncture for their relief. Another possibility is that the hydrocephalus results from lateral sinus thrombosis; in the case reports referred to above there were only five examples of sinus thrombosis, four of which were diagnosed at operation; in the fifth case[1] the diagnosis was made at a later date as a result of the findings at lumbar puncture. Aseptic sinus thrombosis does complicate otitis media, but it is usually discovered only when C.S.F. pressure measurements are made. Further, such a theory is compatible with the recovery which these cases show, as the thrombus will no doubt become canalised in the course of a few weeks. In this connexion it is of interest to note that some authors consider that papillœdema is common in lateral sinus thrombosis.[2] [6]

Our second case shows the development of hydrocephalus in a patient who certainly had no sinus thrombosis, and the large quantities of C.S.F. obtained at lumbar puncture point to the hydrocephalus being of communicating type. We feel, therefore, that neither of our cases throws any light on the pathology of otitic hydrocephalus.

We wish to thank Dr. C. W. Vining, Mr. Maxwell Munby, and Dr. Basil Ewing for the notes of these cases.

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THE AFTER-CARE OF VARICOSE LEGS

BY STUART MCAUSLAND, M.D. LIVERP.

PHYSICIAN IN CHARGE OF VARICOSE VEIN AND HÆMORRHOID CLINICS, HAHNEMANN HOSPITAL, LIVERPOOL

IN view of the general interest in the treatment of varicose ulcers and veins, and in view of the fact that such treatment is attempted by many private practitioners, some note on the after-treatment, based upon experience gained in the treatment of over 3000 cases, might be of interest, particularly as no detailed information on the subject has been published recently.

It is comparatively easy to destroy varicose veins by injection, and to cure varicose ulceration by elastoplast bandaging. Yet all too frequently surgeons stop short at this stage, paying but little attention to the question of after-care. No surgical treatment for the destruction of the offending veins relieves the patient of his tendency to the development of varicosity in his other veins, and no amount of healing of an ulcer will prevent future ulcer formation, unless the underlying causes be eliminated or, at any rate, measures be adopted constantly to combat them. It is therefore important to bear in mind all the factors which go to produce varicosity and ulceration and, where possible, to eliminate such factors as may be present in each individual case that has been locally treated.

Constant standing should be interdicted; tight garters should not be worn; men should wear the single suspender (attached to the V of the shirt above, and to the sock below) in place of the usual tight "garter" suspender. Causes of intra-abdominal pressure should be removed, e.g., pelvic tumours; obesity should be treated with thyroid—indeed, Sicard laid great stress on the endocrine aspect of varicose veins and urged a small dose of thyroid for some considerable time. The general health and habits of the patient should be improved, so that he will be less liable to infective diseases, which, by the general lowering of the tone of the muscular system, cause varicosity by their toxæmias. Habits of healthier, and more regular, active fresh air exercise should be instituted, so as again to improve the muscular tone of the legs and prevent "stagnation" and œdema formation. Diet should be regulated so as to lead to "thinning"—particularly reducing meat. These remarks apply especially to stout middle-aged women of all classes.

There still remain, however, in spite of the above general measures, a number of cases that will develop other varicose veins and other ulcers. It must be appreciated that the fundamental cause of the pathology of leg varicosity is, first, the destruction of vein valves, which leads to waterlogging by the force of gravity, plus the consequent lack of tone in calf muscles and calf vein walls. If a case comes early and presents only an isolated varicose vein, which is successfully cured by injection, in an otherwise healthy calf with good muscular tone and no œdema, this case will need no further treatment, apart from these general suggestions. But unfortunately there is that large class whose legs show, not only varicose veins, but also general "brawny" thickening of years' standing, which has led to œdema. If such a case be left long enough without treatment, varicose eczema and, later, varicose ulceration will follow. It is this class of case that essentially but no perforation was seen. The fundi were normal and there were no neurological signs. On the following day a Schwartz mastoid operation was performed; the mastoid cells showed acute hyperæmia but there was no pus in the antrum; the lateral sinus was not exposed. On the following day the temperature was still 102° F. and a lumbar puncture was performed; the fluid was normal except for a slightly positive Lange curve of luetic type. The leucocyte count showed 9600 per c.mm. (79 per cent. polymorphonuclears); blood culture was negative. During the course of the next week the temperature slowly subsided; there was occasional vomiting.

On Nov. 20th lumbar puncture was again performed; the pressure was 300 mm. but the fluid was normal. About this time papillœdema appeared in the left eye and there was a small hæmorrhage near the edge of the right disc; during the course of the next week the papillœdema became bilateral and of increasing intensity, and there was a recurrence of vomiting. By this time the red cell count had fallen to 3,940,000 per c.mm. (colour-index 0·7). During the course of the next four weeks the temperature was normal, although there was still slight tachycardia. The papillœdema slowly subsided without any impairment of visual acuity. The patient was discharged on Jan. 5th. She was re-examined on Feb. 18th, when she was found to be quite well, although still rather pale. There was slight swelling of both discs, though this was confined to the nasal edge on the right side; visual acuity was good and there was no evidence of optic atrophy; the mastoid wound had completely healed.

This patient presented certain diagnostic difficulties during the course of the illness. The long history of pyrexia and the absence of otorrhœa made the diagnosis of simple mastoiditis unlikely, and the severe and recurrent epistaxis was another unusual feature. Further, it was felt that the pathological condition of the mastoid was not sufficient to account for the severe febrile illness, but the development of vomiting and papillœdema suggested the presence of a cerebral abscess. Later, the severity of the papillœdema and the finding of a normal C.S.F., together with the absence of localising signs, made this diagnosis unlikely.

DIFFERENTIAL DIAGNOSIS

Papillœdema and headache developing in a patient who has had recent middle-ear disease at once suggest the presence of a cerebral abscess. The clinical differences between abscess and hydrocephalus were pointed out by Symonds[4]; a C.S.F. which shows a normal cell and protein content, high pressure and excessive volume, associated with a high degree of papillœdema and a condition of mental alertness suggest hydrocephalus and not abscess. As far as we can see, one diagnostic difficulty arises—namely, in those cases where the development of the hydrocephalus is preceded by a phase of meningitis with changes in the C.S.F.; in such an event a correct diagnosis cannot be made until, after repeated lumbar puncture, the fluid returns to normal.

Otogenic meningitis is by no means always fatal, in fact Mygind[3] found 59 recoveries in 210 cases (28 per cent.); of these 36 were under the age of 20. Further, 10 per cent. of cases in which organisms were found in the fluid made a complete recovery, while in 70 per cent. of those dying the fluid was sterile. Mygind divides benign cases of otogenic meningitis into two groups according to the cell content of the fluid; those with a clear fluid he terms "collateral meningitis," of which he quotes 15 examples; five of these had papillœdema and 13 a high C.S.F. pressure. Cases 2 and 3 of his series appear to be examples of otitic hydrocephalus, one of which (Case 2) showed an initial pleocytosis in the fluid. This change in the fluid raises important points with regard to diagnosis and ætiology; a case which at any time shows an increase of cells must clearly come under the heading of meningitis, and at an early stage it is impossible to determine whether the patient is about to develop a condition with a 72 per cent. mortality or the relatively benign condition of hydrocephalus.

There are now at least two cases of otitic hydrocephalus conforming to Symonds's definition in which there was an early meningitis, and one wonders whether such a transient meningitis is not a more common complication of otitis media than is generally supposed. In order to elucidate this point, very early lumbar puncture would have to be performed in many cases of middle-ear disease, and actually this procedure is not carried out until there is evidence suggestive of intracranial complication. One may argue that as far as treatment is concerned the separation of hydrocephalus from meningitis is only an academic point, as in both cases repeated lumbar puncture is called for, but from the point of view of prognosis an accurate diagnosis is very desirable as it is impossible at an early stage to say whether meningitis is benign or not. This diagnostic difficulty is clearly illustrated by another case recently seen by us.

CASE 2.—A girl, aged 9, had acute tonsillitis early in December, 1932, which was followed by pain in the left ear with purulent discharge; two weeks later she suddenly developed severe headache and vomiting and was admitted to St. Mary's Hospital, Leeds, when an excess of lymphocytes was found in the C.S.F. She recovered rapidly and was sent home three weeks later, but the headache and vomiting then recurred and a transient squint was noted by the mother; on Jan. 24th she was admitted to the Leeds General Infirmary with intense headache. There was a high degree of papillœdema (bilateral) and slight weakness of the left lower face; the C.S.F. showed a moderate lymphocytosis. The headache improved after lumbar puncture and she remained well for the next few days, although there was a tendency to tilt the occiput to the left and an occasional slight strabismus. The left tympanic membrane was normal in appearance. On Feb. 11th she suddenly became worse, with intense headache, frequent vomiting, clouding of consciousness, and pyrexia up to 103° F. The C.S.F. was now turbid, and showed large numbers of polymorphonuclear leucocytes. Lumbar puncture was carried out on several occasions, and the condition slowly improved, though there was another attack of severe headache and drowsiness on March 21st, after which she improved rapidly. During the early stage of the illness she was strikingly facile but the mental condition later became quite normal; the papillœdema disappeared and visual acuity remained good.

Following the attack of Feb. 11th the pupils became unequal and reacted sluggishly to light, the left abdominal reflexes were sluggish, and the left plantar response equivocal; these signs disappeared with the exception of the facial weakness, which took some weeks to clear up. Further, the temperature slowly subsided with occasional rises to 101° F., but it was normal after six weeks; similarly the pulse-rate, which was 168 on Feb. 11th, fell to normal.

Lumbar Puncture Results

Date in 1933.	Appearance.	Cells.			Chlorides	Protein.	Sugar.
		Total.	Poly.	Lymph.			
			p.c.	p.c.	p.c.	p.c.	p.c.
Jan. 25	Clear.	22	0	100	0·70	—	0·055
Feb. 13	Turbid.	N.P.	N.P.	—	0·68	0·12	0·040
" 21	"	260	99	1	0·67	—	0·010
March 1	Clear.	36	86	14	0·70	0·09	—
" 7	"	50	35	65	0·72	0·11	0·060
" 13	Turbid.	301	27	73	0·68	—	—
" 17	"	450	18	82	—	—	—
April 4	Clear.	30	10	90	—	0·090	0·048
" 12	"	6	0	100	—	0·050	—

N.P. = numerous polymorphs. p.c. = per cent.

She vomited occasionally. Lumbar puncture was carried out 35 times and a summary of the findings is given in the Table. The C.S.F. pressure was always more than 300 mm. except at the end of March, when it became subnormal, but on April 11th it was 170 mm.; large quantities of fluid (up to 60 c.cm.) were run off at each puncture, but towards the end of March the quantity became steadily less. Cultures of the fluid were repeatedly sterile and on no occasion were tubercle bacilli seen.

Throughout the illness the child was coöperative and alert, and after six weeks was running about the ward. During the earlier stages of the illness lumbar puncture was followed by intense headache. There was no evidence of lateral sinus thrombosis, and the C.S.F. pressure was increased by compression of either jugular vein. An unexpected complication arose on March 10th, when the C.S.F. Wassermann reaction was reported to be slightly positive. We are, however, inclined to disregard this for the following reasons: subsequent examinations have shown a negative reaction, the blood Wassermann reaction is negative, the mother's reaction is negative, and the child shows no stigmata of congenital syphilis, nor is there any history of infection in the parents.

This is clearly a case of benign otogenic meningitis and it is equally clearly a case of hydrocephalus. When she was first seen the patient presented the features of otitic hydrocephalus in which there had been a preliminary mild meningitis, but later she developed a more severe meningeal reaction with many polymorphonuclear leucocytes in the fluid.

PATHOLOGY

The pathology of otitic hydrocephalus is obscure. It has been thought by some to result from oversecretion on the part of the choroid plexuses. Others consider it to be due to blocking of the interventricular foramina by a meningitic process; this theory, however, fails to account for the large quantities of C.S.F. which are obtained at lumbar puncture, although it may explain those cases which require ventricular puncture for their relief. Another possibility is that the hydrocephalus results from lateral sinus thrombosis; in the case reports referred to above there were only five examples of sinus thrombosis, four of which were diagnosed at operation; in the fifth case[1] the diagnosis was made at a later date as a result of the findings at lumbar puncture. Aseptic sinus thrombosis does complicate otitis media, but it is usually discovered only when C.S.F. pressure measurements are made. Further, such a theory is compatible with the recovery which these cases show, as the thrombus will no doubt become canalised in the course of a few weeks. In this connexion it is of interest to note that some authors consider that papillœdema is common in lateral sinus thrombosis.[2] [6]

Our second case shows the development of hydrocephalus in a patient who certainly had no sinus thrombosis, and the large quantities of C.S.F. obtained at lumbar puncture point to the hydrocephalus being of communicating type. We feel, therefore, that neither of our cases throws any light on the pathology of otitic hydrocephalus.

We wish to thank Dr. C. W. Vining, Mr. Maxwell Munby, and Dr. Basil Ewing for the notes of these cases.

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THE AFTER-CARE OF VARICOSE LEGS

By Stuart McAusland, M.D. Liverp.

PHYSICIAN IN CHARGE OF VARICOSE VEIN AND HÆMORRHOID CLINICS, HAHNEMANN HOSPITAL, LIVERPOOL

In view of the general interest in the treatment of varicose ulcers and veins, and in view of the fact that such treatment is attempted by many private practitioners, some note on the after-treatment, based upon experience gained in the treatment of over 3000 cases, might be of interest, particularly as no detailed information on the subject has been published recently.

It is comparatively easy to destroy varicose veins by injection, and to cure varicose ulceration by elastoplast bandaging. Yet all too frequently surgeons stop short at this stage, paying but little attention to the question of after-care. No surgical treatment for the destruction of the offending veins relieves the patient of his tendency to the development of varicosity in his other veins, and no amount of healing of an ulcer will prevent future ulcer formation, unless the underlying causes be eliminated or, at any rate, measures be adopted constantly to combat them. It is therefore important to bear in mind all the factors which go to produce varicosity and ulceration and, where possible, to eliminate such factors as may be present in each individual case that has been locally treated.

Constant standing should be interdicted; tight garters should not be worn; men should wear the single suspender (attached to the V of the shirt above, and to the sock below) in place of the usual tight "garter" suspender. Causes of intra-abdominal pressure should be removed, e.g., pelvic tumours; obesity should be treated with thyroid—indeed, Sicard laid great stress on the endocrine aspect of varicose veins and urged a small dose of thyroid for some considerable time. The general health and habits of the patient should be improved, so that he will be less liable to infective diseases, which, by the general lowering of the tone of the muscular system, cause varicosity by their toxæmias. Habits of healthier, and more regular, active fresh air exercise should be instituted, so as again to improve the muscular tone of the legs and prevent "stagnation" and œdema formation. Diet should be regulated so as to lead to "thinning"—particularly reducing meat. These remarks apply especially to stout middle-aged women of all classes.

There still remain, however, in spite of the above general measures, a number of cases that will develop other varicose veins and other ulcers. It must be appreciated that the fundamental cause of the pathology of leg varicosity is, first, the destruction of vein valves, which leads to waterlogging by the force of gravity, plus the consequent lack of tone in calf muscles and calf vein walls. If a case comes early and presents only an isolated varicose vein, which is successfully cured by injection, in an otherwise healthy calf with good muscular tone and no œdema, this case will need no further treatment, apart from these general suggestions. But unfortunately there is that large class whose legs show, not only varicose veins, but also general "brawny" thickening of years' standing, which has led to œdema. If such a case be left long enough without treatment, varicose eczema and, later, varicose ulceration will follow. It is this class of case that essentially needs subsequent local leg support for many months, or even permanently.

When the injection treatment is finished, such legs will, for a short time, feel lighter but, unless some local support be worn, the heavy, swollen condition will return in a few months, with the development of other varices. Moreover, the simultaneous wearing of some kind of support and the taking of much more active exercise than had been possible before the injection treatment frequently leads to a permanent return of tone and vigour in the calf muscles by preventing them, for some few months after the termination of active treatment, from ever again becoming dropsical and waterlogged. Thus often the patient may be enabled, ultimately and entirely, to dispense with bandages or stocking supports. It is also generally most important—after the closure of (and cure of) a varicose ulcer—that the leg, which was formerly so dropsical that the ulcer occurred, should be almost as firmly supported for *several months* as it was by the tight elastoplast bandage which effected the cure of the ulcer.

SUPPORTS EMPLOYED

After discarding the cotton elastic adhesive bandages which the patient has worn during the injection treatment, it is a wise plan to maintain for a few weeks the "bandage-pressure" by means of a half-spread cotton elastic adhesive bandage, such as semiplast. In this type of bandage only the first turn of the zinc oxide emulsion comes into contact with the skin, and the pressure is not so uncomfortably great as with the fully spread bandage. This type of bandage is also advisable for a few weeks in cases of cured ulceration. Pressure is to be maintained while the patient takes increasing exercise.

It sometimes happens that an ulcer may be complicated with a surrounding "weepy" dropsical varicose eczema. When I have healed up such ulcers I apply for two or three weeks an Unna's paste type of bandage, medicated with ichthyol. In all such cases this treatment has been most satisfactory, giving the necessary support and curing the skin condition—e.g., an icthopaste bandage. When the leg has returned to, and been thus for some time kept at, more normal proportions, a more permanent type of support must be considered—a type also that the patient himself can apply. They are of two kinds:—

(1) *Bandages.*—A crêpe bandage is suitable in hospital practice on account of its cheapness. Personally, I have found that elastocrêpe is an improvement on ordinary crêpe, for it gives more support and it has certainly more elasticity, and its life is still further lengthened by washing; it does not "fluff." The bandage should be worn in the daytime, applied by the patient himself each morning, tightly wound, starting at the toes (applied in just the same manner that the patient saw the elastoplast applied), going up to the knees. A crêpe bandage, in which are incorporated a few thin longitudinal strands of rubber, gives still greater support, has much more elasticity, and retains better its position on the leg than does plain crêpe.

(2) *Stockings.*—Some patients, however, cannot take the trouble daily to bind their legs, and others cannot bandage sufficiently satisfactorily to prevent the bandage from slipping; others again, especially women, object to the bandages showing through their stockings. For these types of patient one can recommend specially woven cotton stockings which are so made that they have considerable elasticity, and which must be made to the individual patient's leg measurements. They last for several months and are readily washable—e.g., "Compri-Vena" stockings. Being cotton and very transparent they are not hot to wear and are not noticeable under thin silk stockings. For very stout legs, however, into which (unless supported) the œdema soon returns, elastic stockings—specially made to measurement—are essential, particularly in cases of old-standing chronic phlebitic legs.

An illustrative case may be quoted. A tall, enormously stout man, aged 80, weighing 18 st., was first seen a year ago. His right leg was exceedingly œdematous, tense, and shiny from the knee downwards. There was a previous history of slight phlebitis before treatment; no varicose veins were obvious. For the past two years he had had a varicose ulcer, 2 inches in diameter, 1¾ inches deep, on the outer side of the lower right calf; the ulcer was most painful. His own doctor had once loosely applied an elastoplast bandage, and had used countless ointments. The leg was very tightly bandaged, using all possible force, with elastoplast, and a fresh bandage applied each week. The size of the leg was very considerably reduced, driving out the dropsy, and the ulcer healed in seven weeks. In the course of the treatment some superficial varices appeared and were injected. This leg had been dropsical for seven years. The varicose ulcer was a terminal condition or pathological end-result of the dropsy. The waterlogged condition was removed and the ulcer healed. It would, however, have been useless to discharge the patient without local supporting measures to prevent his leg from relapsing into its former condition. The leg had been, during many years, too dropsical and waterlogged for it to be able to "stand up" on its own account in its fight with "gravity." An accurately fitted silk elastic stocking was provided in this case, and the leg is still, a year later, in a reasonably healthy condition with practically no dropsy, no ulcer, and no pain.

It is naturally difficult to give statistical results of this after-care treatment, but I am satisfied that, when attention has been paid to the general health conditions outlined above and when, in particular, either temporary or permanent supports have been worn, injection or ulcer bandaging treatment has led to more permanent results, thus reflecting greater credit on the primary treatment and giving more lasting joy and comfort to the patients.

SUMMARY

(1) The tendency to the development of varicose veins and ulceration is not cured merely by the injection (and therefore local destruction) of the varix, nor by the healing-up of an individual varicose ulcer.

(2) All underlying causes must be found and, where possible, eliminated; general health must be improved and regular healthy exercise instituted.

(3) The fundamental causes of ulceration are "waterlogging" by gravity and consequent atonicity.

(4) For some subsequent months, and often permanently, local leg supports must be worn in order to retain the leg in normal proportions and to assist in the regaining of muscle tone. Half-spread cotton elastic adhesive bandages, elastocrêpe, specially woven cotton stockings, and elastic stockings are recommended.

NATURE AND RÔLE OF BACTERIAL ALLERGY.—Reference 10 in Prof. A. R. Rich's paper, which appeared at the front of our issue of Sept. 2nd, dealing with the establishment of allergy in the absence of immunity, should have read Sabin, *F. R.*, Smithburn, K. C., and Geiger, J. T. We regret that by an oversight Dr. Sabin's initials were wrongly given.

Clinical and Laboratory Notes

A MANIPULATIVE METHOD FOR THE REDUCTION OF FRACTURES OF THE SURGICAL NECK OF THE HUMERUS

By Claude Frankau, C.B.E., D.S.O., M.S. Lond., F.R.C.S. Eng.

SURGEON TO ST. GEORGE'S HOSPITAL

The reduction of the typical deformity present in fracture of the surgical neck of the humerus—the upper fragment being abducted and the lower fragment adducted and drawn up into the axilla—is notoriously difficult to overcome by the methods of manipulation and traction in abduction usually advocated. So much is this the case that operation has not infrequently to be resorted to to secure proper reposition of the fragments. While operating on such a case, which had resisted powerful traction for some days, I observed that even after freely exposing the fragments it was impossible to obtain reposition until the arm was pulled right across the trunk to the opposite side of the body—but with this manœuvre immediate and easy reposition was obtained. It appeared from this that it might be possible to obtain an equally good result by manipulation only, without operation, and in the next case that came under my care I carried this into practice.

FIG. 1

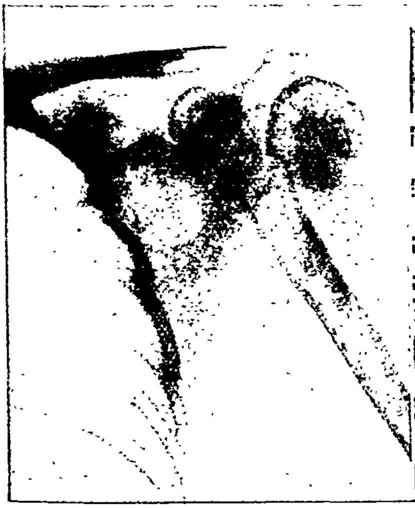


FIG. 2

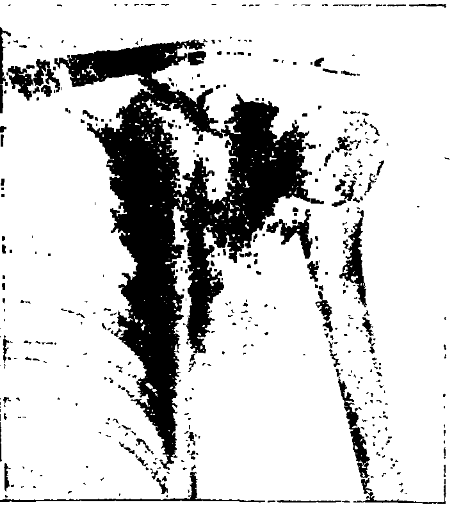


FIG. 3

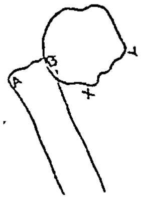


FIG. 4

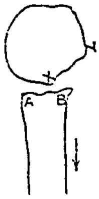


FIG. 5

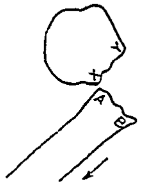
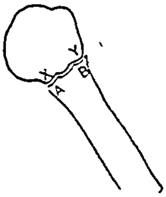


FIG. 6



The patient was a well-developed woman of 50 who had injured her shoulder six days previously; the X ray appearance is shown in Fig. 1. Under deep anæsthesia strong traction was exerted in the line of the long axis of the arm for some minutes, then crossing over to the opposite side of the body the arm was adducted across the trunk—adduction being carried out to the fullest possible extent and full traction being exerted. After a few moments there was a sharp crack, presumably due to the point A on the lower fragment slipping over the point X on the upper fragment (Fig. 5), and the fragments were felt to have engaged and to move together on moving the arm. A further radiogram taken three days later showed perfect anatomical reposition of the fragments (Fig. 2).

I have used this method now in five cases with an accurate reposition of the fragments in each case, and it would appear that this simple manipulative method is the method of choice for this injury.

The accompanying diagrams of the left humerus, in which XY is the line of the fracture in the upper and AB in the lower fragment, give an outline of the method. Fig. 3 shows the fracture unreduced; Fig. 4 the effect of simple traction in the line of the limb; Fig. 5 the effect of adduction bringing the points X and A into apposition; and Fig. 6 the final result. The treatment after reduction consists in immobilising the arm by bandaging to the side with a pad in the axilla for seven days; gentle stroking massage is then commenced and the patient is encouraged to employ active movements; at the end of fourteen days more active massage and passive movements are employed and complete restoration of function should be obtained in about six weeks.

I have to thank my friend Mr. Gwynne Williams, who had made the same observation on the value of adduction, for much valuable help in working out this method which I have frequently discussed with him.

CASE OF PATHOLOGICAL CALCIFICATION

By L. B. Stott, *M.C.*, M.B. Liverp., D.P.H.

FIRST ASSISTANT MEDICAL OFFICER, PAPWORTH VILLAGE SETTLEMENT; AND

V. Cotton-Cornwall, M.B. Liverp.

THIRD ASSISTANT MEDICAL OFFICER AT THE SETTLEMENT

Since the days of Aristotle[1] pathological calcification has been recognised, but not until the introduction of X rays was it found to be fairly common. Modern text-books mention that it occurs commonly in tuberculosis, but we have been able to find few cases reported in England or America during the last 24 years. Dwight[2] describes a case where a band of calcified pleura caused thoracic scoliosis. In the radiogram the bar was less opaque than the ribs, presumably because it is not true bone. Pritchard[3] published a series of cases of pathological calcification in the thorax due to various causes, and his Case 11 bears some resemblance to our case in radiological appearance but not in ætiology. Stein[4] reports a case where the left parietal and visceral pleuræ were calcified in part, enclosing a cavity containing a cholesterol thorax. The case that we are reporting differs, however, from all these in that the splenic capsule is also partially calcified, and the thoracic plaque appears to be extrapleural.

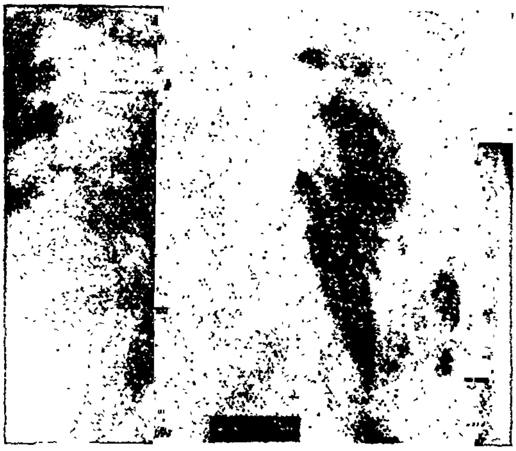


FIG. 1.—Radiogram of pleural plaque.

A male, aged 59 years, a gold-miner for 30 years. There was a history of four years' illness before admission to Papworth, in January, 1932. He then had bilateral fibrotic disease, especially on the left where air entry was poor. The radiogram reproduced (Fig. 1) shows infiltration in the upper and middle zones on both sides and sharply defined opacity in the left lower zone, which looks more dense than the rib shadows.

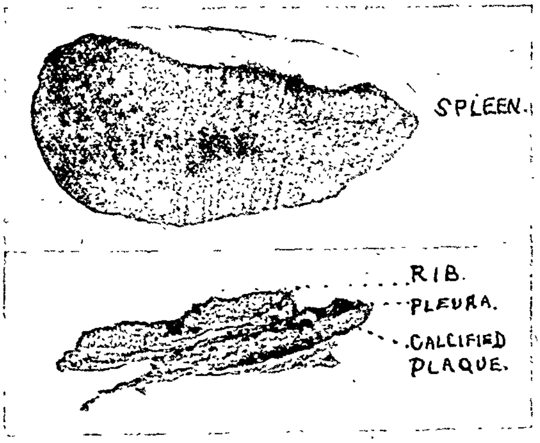


FIG. 2.—Above: Photograph showing calcified plaque in the spleen. Below: Ribs and attached calcified plaque.

The patient was febrile in February, 1932, but later became afebrile and was able to undertake intermittent work on the poultry farm from April to December, 1932, when he became too dyspnœic for any exertion. In January, 1933, the left side of chest was dull to percussion with poor air entry and many crepitations. On the right the breath sounds were harsh and accompanied by crepitations and rhonchi. In March both bases became very congested. There was marked arterio-sclerosis, and the heart was slow and irregular. Syncope occurred on exertion. The dyspnœa became more marked and frequent, and the patient died during a nocturnal attack on March 27th.

Post-mortem examination (only a partial one allowed).—Lungs: the right showed fibrocaseous disease in all lobes; the left upper lobe was the same, with cavitation; while the base of the left lower lobe showed red hepatisation. Pleuræ: the right was not adherent, but the left parietal was calcified and firmly adherent to adjacent ribs, the sixth and seventh (Fig. 2). Heart: the cardiac muscle was fatty and the organ enlarged; the tricuspid valve dilated. Pericardium: the pericardial sac contained free fluid. Diaphragm: the muscle showed no obvious abnormality. Spleen: the diaphragmatic surface was calcified. Kidneys: capsules stripped easily.

Microscopic examination.—Lung: there is no sign of silicosis, but there is caseation, small round-celled infiltration, giant cell system formation, and tubercles along the subpleural lymphatics. The visceral pleura is greatly thickened; sections of the plaque were not cut on account of its hardness. The spleen shows chronic inflammation only, with the calcified area confined to the capsule (Fig. 3). The calcium content of the splenic plaque was much less than the pleural one.

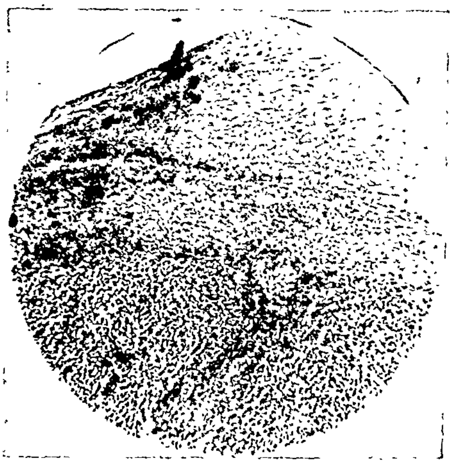


FIG. 3.—Transverse section of spleen and plaque. (× 50.)

The fact that the left parietal and visceral pleuræ were not adherent to each other suggests that the thoracic plaque was extrapleural, although we found nothing post mortem that could account for its extrapleural deposition.

The calcium content of the splenic plaque being considerably less than the thoracic one suggests that it was more recent. Gideon Wells[5] has shown that the composition of the inorganic salts in calcified areas in the body tends to become the same whether the salts are laid down under normal conditions (ossification) or under pathological conditions and whether in tuberculosis or some other lesion that produces avascular necrotic masses in which these salts accumulate.

There is no evidence that the splenic plaque was the result of splenic inflammation nor due to direct spread from the thorax. There were no signs (macroscopic or microscopic) of diaphragmatic inflammation. Morriston Davies[6] has pointed out, however, that the diaphragm is not a continuous sheet of muscle, and that there are two weak spaces, one of these being between the crus and the fibres attached to the twelfth rib (foramen of Bodalek). Part of the diaphragmatic surface of the spleen would be in juxtaposition to this spot, and so this calcifying splenic lesion might be the result of direct spread.

Our thanks are due to Sir Pendrill Varrier-Jones for permission to report this case, and to Dr. E. E.

Atkin, of the Hospital for Consumption, Brompton, for advice.

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RICKETS IN A BREAST-FED INFANT

AGED FIVE WEEKS

By Bernard Sandler, M.B. Manch.

SENIOR MEDICAL OFFICER, PARK HOSPITAL, DAVYHULME, NEAR MANCHESTER

That rickets could ever occur in breast-fed infants was long considered doubtful if not impossible. The diagnosis in cases reported by the earlier observers was often based on the beading of the ribs and craniotabes,[1] and as such conditions might be confused with syphilis or achondroplasia, the evidence was regarded by many as insufficient. Thus Wieland[2] was able to say, after an exhaustive survey of the literature, that not a single definite case of congenital rickets had been reported. In many modern standard text-books the statement appears that congenital rickets does not occur, or that it does not appear before the sixth month.[3 4 5 6]

There is, however, a body of evidence accumulating[7 8 9] to show that rickets occurs much earlier than was formerly believed. Schmorl[10] found definite histological signs of rickets at six weeks, and Dunham[11] radiological evidence of rickets at 34 days in a premature infant. Eliot[12] says that it is "uncommon to find a vigorous rapidly growing breast-fed infant who does not show signs of rickets on X ray examination"; and Greenbaum[13] finds radiological evidence of rickets "universally present in breast-fed as well as artificially fed babies, white or black, winter or summer." Whether these are cases of true clinical rickets may be doubted in view of the finding of Farrell and Burt[16] that histological d radiological studies of stillborn infants showed at the radiological "cupping" was not due to ckets but to a normal variation in the zone of reparatory calcification. But, that breast-feeding ill not prevent rickets is shown by the occurrence f tetany in two breast-fed infants of 6 and 12 months espectively, each having well-marked clinical and adiological rickets.[14]

The following case is unique in that it shows a full-time normal breast-fed infant with well-developed rickets, demonstrable both clinically and radiologically at 5 weeks of age.

The child, a girl, was born in Park Hospital on August 8th, 1932, and weighed 5 lb. 6 oz. at birth. She appeared normal in every respect, was put to the breast and appeared to do well, her weight being 6 lb. 4 oz. on the tenth day. On August 26th the mother was transferred to a medical ward accompanied by the child, and on Sept. 2nd the child was reported as being rather fretful at times. By the 13th she had become very fretful, and her weight had been stationary for the previous week. She was taking the breast well, and seemed satisfied. There appeared to be ample breast milk, and the stools were normal, and there was no vomiting. On the 15th I was asked to see the child because she was now extremely irritable, obviously not well, and yet the cause was not apparent.

The skin was greyish-blue, and the forehead bossed. The anterior fontanelle was widely open, and the cranial bones were soft. The epiphyses of the long bones were enlarged, and there was definite beading of the ribs. The abdomen was prominent—a typical "pot-belly." Muscle tone was very poor. The stools by now were green and relaxed. The heart and lungs were normal.

On the above clinical findings rickets was diagnosed, and confirmed by a film on Sept. 15th. Dr. E. D. Gray reported: "There is increased width and cupping of the lower ends of the radius and ulna. The appearances are consistent with those of rickets." Owing to some difficulty with the mother, breast-feeding had to be discontinued, and the child was given a milk-and-water mixture, cod-liver oil, and ultra-violet light irradiation. The irritability rapidly improved after the use of Kalzana grs. 5, b.d. On Oct. 31st radiography showed great improvement, the bones appearing almost normal.

The mother, aged 40, said she had had pleurisy at 14 and typhoid fever at 19. Her obstetric history was:—

1918: Twins, one of whom had rickets.
1919: Full-term normal child; did not walk till 14 months.
1921: Full-term child; died of pneumonia, aged 12 months.
1922: Full-term; developed rickets.
1925: Seven months premature; ? rickets later.
1930: Full-term; died of congenital heart disease.

All these children were breast-fed. The present pregnancy had been normal except for severe hyperemesis at three and a half months. She was admitted to hospital on July 23rd, 1932, three weeks before term, because of dizziness and fainting. This was found to be due to a secondary anæmia, the blood count being: red cells, 3,230,000; white cells, 6500; hæmoglobin, 32 per cent.; colour-index, 0·5. The Wassermann reaction was negative.

Great difficulty was encountered in getting her to take any food at all except bread and butter. She said that for 20 years since her typhoid fever she had never eaten meat, and that it made her sick. This, of course, she easily demonstrated, and in spite of every persuasion she consistently refused to eat any meat, fish, chicken, eggs, potatoes, fruit, or vegetables. The only food she took was bread and butter, sago, tea, and a little milk. In spite of this remarkable dietary she was fairly well nourished, and no physical abnormality could be detected, apart from some septic dental roots which were removed on Sept. 8th, 1932. Radiography of the long bones revealed no sign of osteomalacia. As a result of much effort with her diet and drugs her count was raised on Sept. 15th to: red cells, 4,130,000; hæmoglobin, 58 per cent.; and colour-index, 0·7. Unfortunately it was not possible to estimate the serum calcium either of her or the child at the time, but it is clear that the mother's diet would undoubtedly produce rickets if fed to a growing child, and had certainly produced in her a secondary anæmia.

CONCLUSIONS

1. Rickets can occur in a breast-fed infant.

2. From the early age at which florid rickets was observed to be well established, it seems that the process must have commenced prenatally. This is supported by the evidence of vitamin deficiency in the mother's diet, and corroborates the statement of Hess[15] that "there is a prenatal factor . . . and the diet of a pregnant woman plays a rôle in the development of rickets."

I am indebted to Dr. E. D. Gray for the report on the films, and to Dr. D. W. Davidson, medical superintendent of the hospital, for permission to publish this case.

(*References at foot of next page*)

REVIEWS AND NOTICES OF BOOKS

Clinical Study and Treatment of Sick Children

By JOHN THOMSON, M.D., LL.D., F.R.C.P. Lond. and Edin. Fourth edition, rewritten and enlarged by LEONARD FINDLAY, M.D., D.Sc., M.R.C.P., F.R.F.P.S.G., Physician, Princess Elizabeth of York Hospital for Children, London; formerly Professor of Pædiatrics, Glasgow University. Edinburgh and London: Oliver and Boyd. 1933. Pp. 1075. 30*s.*

THE complete revision of a medical text-book that has already become a classic is a task demanding not only knowledge but finesse, and Dr. Findlay is to be congratulated on his achievement. He has succeeded in retaining many of the personal observations that made the late Dr. John Thomson a clinician and teacher of distinction, whilst adding to them from his own wide experience. The welding of the teaching of the schools of Edinburgh and Glasgow is a happy one. It is 35 years since the first and seven years since the last editions of the book were published, and it is interesting to see how many of the original clinical descriptions are still as complete as any that can be found in the literature. Advance has principally been made with regard to our knowledge of the ætiology, and particularly of the biochemical basis, of disease in childhood, and revision here has had to be extensive; changes in treatment are perhaps less striking. The chapters on nutritional disease in infancy, rickets, the "so-called acid intoxications," rheumatic infection, and tuberculosis have been very largely recast, and whilst they necessarily contain a certain amount of controversial matter the experimental work which has led to the views expressed is well described. The section dealing with thoracic tuberculosis is prefaced by an admirable note on radiography of the chest, in which emphasis is laid on the frequency with which blood-vessels seen end-on, or other structures, in the vicinity of the hilum are described as calcified lymph-glands. Such statements as that "pulmonary tuberculosis is pre-eminently a disease of infancy and early childhood," though possibly true of certain communities, will hardly find general acceptance, whilst the author's somewhat sweeping dismissal of the examination of stomach-washings for tubercle bacilli in cases where direct sputum examination has been unsuccessful may be challenged.

The book retains the high standard of illustration and documentation of the earlier editions, and also Dr. Thomson's conception of pædiatrics not as a "specialty" so much as a study of general medicine applied to infancy and childhood.

Obstetrics and Gynecology

Edited by Prof. A. H. CURTIS, M.D., Head of Department of Obstetrics and Gynecology, Northwestern University Medical School; Chief of Gynecological Service, Passavant Memorial Hospital, Chicago. London: W. B. Saunders Co., Ltd. 1933. In three volumes. Vol. I. Pp. 1165. 55*s.*

To this new work there are no less than 80 contributors, of whom 26 appear in the first volume. This first volume deals with history, anatomy, embryology, physiology, normal pregnancy and labour, and some subjects in the pathology of pregnancy. It may be doubted whether the advantages of this method of compiling a text-book on obstetrics and gynæcology are not outweighed by the disadvantages. In obstetrics especially, careful collaboration between the authors is necessary in order to avoid redundancy, and to ensure adequate treatment of every branch. Gynæcology, which will be dealt with in later volumes, can more easily be divided into a number of small sections, each of which can be allocated to a different writer without much danger of overlapping. Nearly one-sixth of this volume is devoted to history, a rather disproportionate amount in a work of this size. The author begins by tracing the progress of English obstetrics from medieval times to the eighteenth century, and the development of forceps from Chamberlen to Kjelland. He then goes back to describe the work of Paré and his successors in France. The Greek and Roman obstetricians are only mentioned incidentally, and we have failed to find the name of Soranus—surely one of the greatest of the early authors. Descriptions are given of the work of a large number of the later English and American obstetricians and gynæcologists, many of them relatively insignificant, but there is little attempt to give a connected account of the development of the subject as a whole. The chapters on physiology and embryology are very good. Dr. Emil Novak, admittedly a master of his subject, writes on the physiology of the reproductive organs apart from pregnancy. This section is the best in the book and could indeed hardly be improved. There is a chapter on sexual intercourse, usually neglected in general text-books, and one by Dr. Carl G. Hartman on the reproductive cycle in animals. The arrangement of the chapters is sometimes peculiar—for example, one on the embryology of the female generative tract appears in the middle of the section on the morphology and physiology of pregnancy.

The clinical chapters are not quite of the same high standard as those on physiology and morphology. The management, physiology, and diagnosis of pregnancy are dealt with by different authors, who have been allowed to digress beyond their proper boundaries, sometimes with unhappy results. For example, asphyxia neonatorum is described shortly and inadequately in two chapters—that on the conduct of normal labour, and that on the new-born child. In some sections, for instance that on maternal illnesses complicating pregnancy, the author gives a series of opinions quoted from different authorities

(*Continued from previous page*)

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without attempting to integrate them, so that it would be very difficult to obtain guidance in the management of a particular case. From the obstetrician's point of view such a chapter may be useful, but it would be confusing even to a general practitioner, and the absence of any definite teaching makes it almost useless to a student. Division of work has resulted in such anomalies as a discussion of lactation in the chapter on the puerperium and of breast-feeding in the chapter on the new-born child; artificial feeding is hardly mentioned. In general the sections on pregnancy and labour are adequate, but they could have been vastly improved by more coöperation between the authors. Most of the necessary information is in the book somewhere, but it is difficult to find, and reference to several chapters may be needed for full information on any one subject. The illustrations are good, and the lists of references to the literature are very full.

Aids to Gynæcology

Eighth edition. By RICHARD E. TOTTENHAM, M.D., D.P.H., F.R.C.P.I., F.C.O.G., Professor of Obstetrics and Gynæcology, University of Hong-Kong. London: Baillière, Tindall and Cox. 1932. Pp. 214. 3*s.* 6*d.*

THIS little book gives a well-balanced account of gynæcology in very small compass. The descriptions are clear and the teaching is dogmatic; students entering for their final examination will thus find it useful for revision purposes. They should note that the treatment advised is not always in accord with the teaching in London medical schools. We doubt if ventral suspension by stitching the fundus of the uterus as low down as possible on the anterior abdominal wall should be recommended as the operation of choice in the treatment of retroversion, and Dr. Tottenham does not even mention that sacculation of the uterus will infallibly occur if the patient has another pregnancy. Sarcomatous changes in myomata are given as an indication for X rays, in preference to operation; in actual fact the diagnosis can rarely be established without hysterectomy. The name Olshausen is given as Oldhausen, and Rubin as Reuben. In the section on radium it is stated that one millicurie equals 400 milligramme hours; the correct relation is 133·3 milligramme hours equals one millicurie destroyed. Fibroma of the ovary is not mentioned; and we cannot agree that the presence of chorionic villi in the uterus excludes ectopic gestation. On the whole however the book is adequate to its purpose and the photographs and diagrams which illustrate it are clear and effective.

Researches on Tuberculosis

Recherches sur l'infection l'hypersensibilité et l'immunité vis-à-vis des formes virulentes ou atténuées du virus tuberculeux. By JEAN VAN BENEDEN, Chef des Travaux des Laboratoires de Bactériologie et d'Hygiène de l'Université de Liége. Paris: Masson et Cie. Pp. 136. Fr.25.

Dr. Jean van Beneden, whose researches on tuberculosis are well known, has set forth in this small book experimental data on two subjects which the French school of bacteriologists have studied exhaustively, notably the filtrable virus of tuberculosis and prophylactic immunisation with the B C G strain of attenuated bovine strain of tubercle bacillus first isolated by Calmette and Guérin. On the first of these subjects the author produces a wealth of material which in his view leads conclusively to the belief that inoculation of filtrable virus products into the guinea-pig increases the animal's resistance to subsequent infection with tuberculosis, and that resistance is manifest even before hypersensitiveness to tuberculin is elicited. Furthermore, filtrable virus inoculated into guinea-pigs does not increase the virulence of B C G, but rather enables the animals to withstand larger doses. Dr. van Beneden believes that transplacental transmission of filtrable virus is probably commoner than is supposed. With regard to B C G he is convinced as the result of his experiments that this strain is stable and of definitely attenuated virulence, and that, contrary to the views of some bacteriologists, it is not possible to dissociate virulent and non-virulent colonies from the original culture. The time has now come, he considers, when bacteriologists should clearly distinguish between the various reactions of infection and immunity. The monograph has a number of illustrations; some, such as those of R and S colonies of B C G, are clear and helpful, but those of inoculated guinea-pigs are too small and lacking in detail to be of much use to the reader. A good bibliography is appended.

Practical Physiological Chemistry

Ninth edition. By SYDNEY W. COLE, M.A., University Lecturer in Medical Chemistry, Cambridge. Cambridge: W. Heffer and Sons, Ltd. 1933. Pp. 419. 12*s.* 6*d.*

BIOCHEMISTRY can be a very depressing subject to the student. He is set to study complicated compounds whose constitutions are either unknown or completely beyond his understanding. He must test for these by colour reactions which often no man, not even his teacher, can explain. The lucid explanations where explanation is possible, the increasing conciseness, and the summarising tables to be found in Mr. Cole's new edition should serve to mitigate distress. The biochemical student's memory is severely taxed, since for examination purposes he is forced to memorise the actual quantities of reagents to be used in his estimations—knowledge possibly of use to laboratory attendants but unnecessary in research workers, and ludicrous from the point of view of the future practitioner. The insistence on the association of tests and estimations with the names of their authors or modifiers is a pious habit designed to give recognition where it is due, but such labels tend to become, like leitmotife, specific to the person and not to the situation. Thus it comes that the less bright student may use the wrong "Benedict's." Happily, Mr. Cole has now given a few tests new names which give some hint as to their nature or purpose; and thus a move has been made in the right direction.

One would say that in the preparation of this edition Mr. Cole was in iconoclastic mood, were it not that each shattered image is replaced by a new one. The names and procedures for Millon's and the Hopkins-Cole reactions have been altered; Seliwanoff's test for fructose is replaced by Foulger's; and, most dramatic change of all, the only method for estimation of sugars to be found in the chapter on carbohydrates is Cole's ferricyanide-methylene-blue method. For the estimation of blood-sugar the Hagedorn-Jensen method is given; but would not Mr. Cole have done well to give as an alternative the Folin-Wu method, which is simpler and can be done easily by students? He is to be congratulated on having removed the lengthy discussion of Werner's formula for urea and on introducing the ninhydrin, Sakaguchi, Sullivan, and van den Bergh reactions. Containing descriptions of these reactions, of the preparation of the "Nadi" reagent and of Pirie's methods for the preparation of both reduced and oxidised glutathione, the new edition will prove a valuable reference book for research workers.

The chapter on oxidising and reducing mechanisms is of particular interest as a statement ex cathedra of the Cambridge school's views. It now seems possible that the main function of glutathione is that of co-enzyme rather than oxidative catalyst. Mr. Cole implies that the oxidation by air of reduced glutathione is catalysed by iron ; but is this expedient when Dr. Voegtlin's preparations autoxidise only in the presence of copper, and Dr. Pirie's purest preparations are apparently not autoxidisable at all ? The catalysis by iron salts of the autoxidation of glutathione occurs in the presence of its hydrolytic *decomposition products. In the discussion* of intracellular respiration, Mr. Cole shows himself as a champion of Prof. Keilin's cytochrome-indophenol oxidase system. He also states : "Warburg has described what he calls the 'second oxidation ferment.'" Since Warburg's first oxidation ferment receives no mention, this witty thrust will be much appreciated by the *cognoscenti.*

Comparison of this edition with its predecessors shows how rapidly ideas are changing in biochemistry and what drastic steps teachers have to take in order to cope with the advances being made. Practically this whole work has been revised ; a large part has been rewritten. Experiments have not been altered so much, although by elimination of a number of alternative analytical methods the book has been reduced in size ; the descriptive and "theoretical" parts are in places so changed as to be almost unrecognisable.

Gedanken eines Arztes über Seele, Natur und Gott

By Dr. F. Parkes Weber, *Arzt am deutschen Hospital in London. Stuttgart : Ferdinand Enke.* 1933. Pp. 124. R.M.5.20.

Since the thoughtful essays contained in this volume have already been issued in English, either in the medical press or in private circulation, it would be churlish to regret that their first appearance in convenient collected form should be in German. The translation, by Dr. J. P. zum Busch, formerly a colleague of Dr. Parkes Weber on the staff of the German Hospital in London, is excellent, as is the arrangement of the essays. These fall naturally into the three groups suggested in the title. The first group indicates the author's attitude towards modern psychological teaching ; there follow essays on more purely medical subjects, which by their philosophic treatment are lifted to a universal level ; and lastly come the most personal essays in this very personal work, giving the author's confession of faith. The book is dedicated to Dr. Hedwig Weber, who has written a preface to it.

Internal Medicine

In Contributions by Various American Authors. Edited by John H. Musser, M.D., F.A.C.P. London : Henry Kimpton. Pp. 1316. 50s.

The editor of this compendium has shown insight in the choice of his contributors. They are 27 in number and each writes in a style which makes the book a pleasure to read. Too many text-books are little more than collections of facts in no way integrated, but here we have a refreshing mode of presentation in which diseases are discussed with an understanding met with as a rule only in an authoritative monograph. Basic principles are given a prominent position and the method throughout is to stress main issues rather than give an exhaustive account. The allocation of space seems very wise, rare diseases being left out or treated very briefly. On the other hand recent advances of importance are included and short bibliographies are given at the ends of the sections. An enlightened book which can be warmly recommended equally to the student and the expert.

The price of Horsley's "Surgery of the Stomach and Duodenum," reviewed last week (p. 707), is 35*s*., and not as stated.

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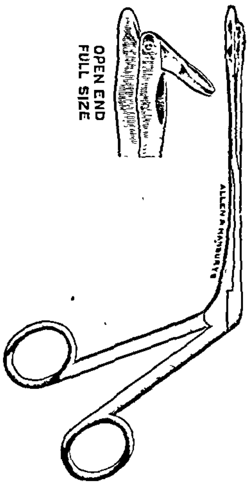
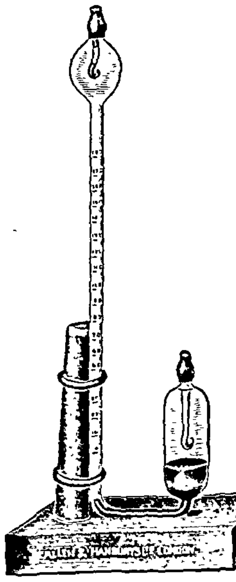


Intranasal antrum punch.



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See also pp. 16, 26 *&* 27

THE LANCET

LONDON: SATURDAY, SEPTEMBER 30, 1933

MEASURING THYROID DYSFUNCTION

A TRUSTWORTHY test for thyrotoxicosis is ardently desired by clinicians, not only as a guide to the intensity of the toxæmia, but more particularly as a means of differentiating the disease from a large group of ill-defined morbid states likely to be confused with it. Estimation of the basal metabolic rate demands skill and experience of a high order if the figures obtained are to be of real value. Portable apparatus which eliminates the need for gas analysis can be had, and in skilled hands yields fairly accurate figures; it is however only those accustomed to handle thyrotoxic patients who are able to judge whether the test has been carried out under satisfactory basal conditions—e.g., whether the patient has overbreathed, moved unduly, or failed in some way to coöperate. A drawback to the method is that the patient must be admitted to a clinic for at least a night, otherwise it is impossible to ensure complete mental and physical rest for the whole of the 14 hours or so preceding the estimation. With the Douglas bag and the Haldane method of gas analysis the calculations take so long that there is a limit to the number of B.M.R. estimations it is possible to carry out daily, even in a well-organised clinic.

Because of these difficulties efforts have been made to find a satisfactory substitute for the B.M.R. estimation; many clinicians have been content to use the formulæ of Read, or of Gale and Gale, whereby an attempt is made to calculate metabolic status by employing constants linking up pulse-rate and pulse pressure. Others have not found either of these formulæ safe in practice, nor have they got satisfaction from Goetsch's adrenaline test, Bram's quinine tolerance test, or Kottman's test. The electrical method described by Mrs. M. A. B. BRAZIER, Ph.D., on p. 742 of our present issue seems to promise a solution of many of these difficulties. Her method is based on one devised by M. GILDEMEISTER in 1919; Dr. Brazier has greatly simplified the procedure. The apparatus is portable, and determinations can be made with it in a few minutes. There is no need for preliminary fasting or resting on the part of the patient; direct readings can be taken without disturbing him or relying on his coöperation. The importance of these points in cases of anxiety neurosis where a thyroid factor is under consideration needs no emphasis. Mr. C. A. JOLL, under whose care the majority of the patients have been tested, confirms the value of the new method in differentiating between the various types of thyrotoxic goitre and the non-toxic goitre. Whether the method is capable of distinguishing the thyrotoxic from the pseudo-thyrotoxic patient remains to be seen. Many neurasthenics, patients with so-called irritable heart or effort-syndrome, are now being sent to goitre clinics as "masked hyperthyroidism," a condition which is stated to be one of hyperthyroidism without thyroid enlargement. Thyrotoxicosis does occur not infrequently with trivial thyroid enlargement; it is doubtful if it is ever associated with a thyroid gland of normal size. Trivial enlargement cannot however always be detected by inspection or palpation, even with the greatest care. Hence on the one hand thyrotoxic patients may be overlooked even when the diagnosis has been considered carefully; on the other hand exploratory operations may be carried out on patients with healthy thyroid glands who are neurasthenic—with the risk of adding hypothyroidism to neurasthenia.

The basal metabolic rate is not an entirely satisfactory guide to the differentiation of these cases, which requires the collaboration of cardiologist, neurologist, pathologist, and general physician. This is by no means the same problem as the differentiation of the various diseases of the thyroid gland itself, and offers far greater difficulties. Should it prove feasible to utilise for this purpose the electrical characteristic of the human body called by Dr. Brazier the "impedance angle" (I.A.) the importance of the method will be greatly enhanced, as it will then become unnecessary to interfere with the patient's normal life beyond the few minutes required to apply the test, and there will be no need to wait several hours for the result. From Dr. Brazier's results it seems that the I.A. figures may be easier to interpret than the B.M.R., the allowance to be made for normal variation being less wide. In estimating the B.M.R., variations of plus 15 to minus 15 (Dr. Brazier is perhaps a little too generous) must often be accepted as within the normal range. The test of impedance angle may also prove of value in prognosis and in the estimation of progress under various forms of treatment. Enough has already been achieved to make it desirable for the work to be continued and controlled at other goitre clinics in this and other countries.

MEDICAL OR NON-MEDICAL FACT

THE medical profession has a genuine grievance when its members are summoned to court ostensibly to give evidence of matters of fact and are then compelled to give evidence as experts without the appropriate fee. The report of the Medical Defence Union, presented on Thursday, describes, amongst other matters of interest and importance, a difficulty of this nature which arose in a certain coroner's court. The coroner refused to pay a medical witness the prescribed statutory fee of £1 11*s.* 6*d.* on the ground that he was summoned only as a witness of fact; at the inquest, however, the witness was required to describe the condition of the patient and the nature of the treatment, and was cross-examined generally on the medical aspects of the case. The doctor was advised to pursue the matter in the county court, where he obtained judgment for the proper fee with costs on the highest scale. The same coroner subsequently made further difficulty over the fees of medical witnesses. There was an inquest on a patient who had died under an anæsthetic. The surgeon and anæsthetist furnished the coroner's officer voluntarily with a statement of the evidence they could give. They were warned by the officer of the date fixed for the inquest and were told that their evidence might be required but that the coroner did not intend to serve them with a subpœna. In the circumstances, even if their own interests had not been concerned, they felt obliged to attend the inquest. They were called to give evidence; before they did so, the coroner announced that he did not propose to pay them any fees. He was reminded of the previous county court judgment, but he contended that there was no liability for fees where witnesses attended voluntarily. The wording of the Act was not so clear as to make a second county court action certain of success. The Medical Defence Union therefore preferred to submit a memorial to the Lord Chancellor. First, however, it seemed advisable to communicate with the Coroners' Society; it was represented accordingly that, if this coroner's attitude was persisted in, the Union might have to advise its members to refuse either to attend inquests or to give any information to the coroner's officer unless first served with a subpœna. The Coroners' Society considered the matter and resolved that a registered medical practitioner (*a*) if called to give evidence of medical fact or opinion, is entitled to the medical fee as provided by statute, and (*b*) if called as a witness of non-medical fact, is entitled only to the fee of an ordinary witness. This ruling is valuable and removes most of the previous uncertainty. Death, the nature of an illness or injury, and the details of treatment are all matters of medical fact; cases of non-medical fact—e.g., if a doctor happens to see a traffic accident from a patient's bedroom window—are so comparatively rare as to be negligible. There still remained a doubt, however, as to the effect of not serving a subpœna. In an interview the secretary of the Coroners' Society made it clear that the Society was definitely of opinion that a doctor was entitled to his fee as a medical witness regardless of whether he had or had not been formally subpœnaed to give evidence. On receiving information of the Society's resolution, the Union applied afresh to the coroner for payment of the fees of the surgeon and anæsthetist; he still refused, but, under pressure from the Coroners' Society, abandoned his untenable position and paid the fees in full. The matter thus ended happily. The difficulty was evidently due to the idiosyncrasy of this particular coroner who had also on one occasion intimated that in future he would pay a fee to only one medical witness at an inquest, namely, to the doctor who could give evidence of the cause of death. It would have been a pity if the excellent relations between coroners and the medical profession had been wantonly disturbed.

EXAMINATIONS AND INTELLIGENCE TESTS

PROFOUND uneasiness is felt to-day by psychologists and educationists alike over the way in which our elaborate examination system is functioning, more particularly as a test of scholarship and fitness to enter a university. This was made clear enough at the recent meeting of the British Association at Leicester when the psychology and education sections settled down to a joint discussion on the reliability of examinations. Several of the speakers asserted, and apparently with justice, that many of those who failed to gain scholarships showed by their subsequent school or university careers that they were superior to many who gained them. The conclusion can fairly be drawn that there are many students in our universities and professional schools who ought not to be there, and many suitable students desiring admission who are excluded because of the failure of our examinations to perform the function they are intended to perform. From the point of view of its prognostic value the ordinary examination has long been suspect. The application of mathematical methods of correlation to determine the extent to which the results of entrance examinations are in agreement with those of university examinations has confirmed the suspicion. If complete agreement is expressed as unity, the measure of agreement between the two rarely exceeds 0·3 or 0·4, and may fall considerably below this. Any attempt to forecast the success or failure of a student on the results of an entrance examination may be very wide of the mark. Not only so, but the results of two examinations of the same kind and standard given to the same students at different times may show startling discrepancies. Not only the prognostic value, but the reliability of examinations is open to serious doubt.

The chief cause of unreliability in the results of examinations seems to be the lack of an objective standard with reference to which the papers of the candidates are to be evaluated. The marking of the same papers by different examiners, and even by the same examiners at different times, may show almost incredibly large discrepancies. One of the speakers at Leicester quoted a case where the same geometry paper was marked by 116 teachers of mathematics. With a pass mark of 75, 47 of the teachers gave the paper a pass mark, 69 a failing mark, two marked the paper above 90, one marked it as low as 28. Another case quoted was that of a competitive examination at a French university, where two examiners read the papers. Each drew up a list of successful candidates, and only 50 per cent. of the names in one list were to be found in the other. One candidate who was graded second by one examiner was graded 116th by the other. Such variations may be due to several causes. There may be variations in the estimate of the relative performance of one candidate as compared with the performance of the others; if the candidates represent a highly selected group slight differences will almost inevitably be exaggerated in order to separate them. This would seem at least partly to explain the fact, to which several of the speakers at Leicester called attention, that examinations in the case of highly selected groups are more unreliable than in others. Then again the mark assigned by the examiner will depend on the value he attaches to a particular quality or grade of achievement, as well as to particular items or aspects. It is notorious that some examiners are high markers and others low markers; but if this were all, some method of scaling up or down could be adopted without altering the relative placing of the candidates. The plain truth is that the same quality of achievement has different marks assigned to it, both absolutely and relatively, by different examiners. Other factors may affect the mark given, such as quality or style of penmanship, even the mood or state of health of the examiner. Manifestly examinations will remain unreliable until we radically improve our technique. Certain suggestions were thrown out at Leicester about the directions in which improvement must be sought. The value of an examination will always be conditioned by the extent to which the questions asked can be regarded as truly representative of the subject on which the examination is set. Its value as a measure of attainment will also depend on the possibility of comparing the achievement of the candidates as indicated by the marks with reliable norms of achievement. The marking of papers must be made as nearly as possible objective. Keeping all this in mind it may be possible to make the examination a fairly reliable measure of attainment or achievement. Its prognostic value however will still remain in doubt. As one of the speakers at Leicester remarked, " the result of a single entrance examination limited in scope as at present, even with the best examination technique, may present a distorted and badly weighted index of an individual's normal power."

By supplementing examinations with intelligence tests we are likely less often to go wrong. It would be absurd of course to speak of substituting intelligence tests for examinations. They have entirely different purposes. The intelligence test is designed to measure native ability or capacity, the examination to measure attainment. We cannot dispense with a test of attainment. If however we would measure capacity with a view to the future possibilities of the candidates in our examinations, we must employ the instrument devised for this end. Intelligence tests can be constructed which are free from the defects characteristic of examinations. They can be standardised, and their scoring is objective. Whatever they measure is measured in a definite and reliable way. The results obtained with good intelligence tests, competently administered to a suitable group of pupils or students, are consistent to a high degree; they show nothing comparable to the discrepancies of examination marks. Evidence adduced at Leicester went to show that the inclusion of an intelligence test enhanced the prognostic value of the examination to a significant extent. At the same time it would be easy to make exaggerated claims for the intelligence test. With highly selected groups its prognostic value is by no means great; this would appear to indicate that its measurement is not very fine. The intelligence test fails also to take account of traits of character and personality which may play a predominant part in determining future success.

SHOCK-PROOF X RAY INSTALLATIONS

It is only a few years ago that the occupation of X ray worker was regarded as one to which considerable hazards were attached. A long list of casualties told its own tale, and presently public opinion was sufficiently stirred to result in the formation in 1921 of the British X Ray and Radium Protection Committee, the first of its kind in any country. The series of recommendations drawn up by this committee, over which Sir HUMPHRY ROLLESTON presides, dealing inter alia with radiation and high-tension dangers, are now classical, and these recommendations were adopted by the National Physical Laboratory as a basis in the inspecting and testing facilities which it provides at the request of the committee. Practically every other civilised country has since followed suit, and, at the instance of the British committee, general agreement on the subject was sought and reached at the International Congress of Radiology held at Stockholm in 1928, when an International Protection Committee was set up with Mr. G. W. C. KAYE, D.Sc., and Dr. STANLEY MELVILLE as honorary secretaries. The recommendations of this committee, largely based on the British model, were revised at a Paris congress in 1931; its next meeting will be at Zurich in July of next year when doubtless they will again be considered. There has thus been world-wide recognition of the benefits which have accrued to the X ray worker through these recommendations; and where an honest attempt is made to live up to their spirit, the occupation of X ray worker is now no more hazardous than countless other occupations. Radiation dangers were largely nullified by the development of the self-protected X ray tube. High-tension risks, which have grown apace with the power of X ray generators, have been met either by earthed shields or guards suitably disposed, or, more recently, by the introduction of shock-proof tubes and high-tension cable provided throughout with earthed sheathing. If these are used no harm can result from accidental contact of the worker or patient with any part of the plant and for this reason shock-proof apparatus was specially commended by the International Protection Committee in 1931. It is now obtainable—at a price—for stationary as well as for portable sets.

The recent fatality at Wimbledon draws attention to the dangers attending the use of apparatus even of a modern type, under periodical inspection by the makers, if it is not completely shock proof. A nurse was electrocuted by a 50,000 volt discharge from a trolley X ray outfit which was being used for radiography in one of the wards, in circumstances which were clearly set out by Dr. F. T. BURKITT in our last issue (p. 728). It was suggested at the inquest that the non-earthing of the bed of the patient was a major factor in the accident, but it appears almost certain that the nurse received a direct shock from the outfit. The coroner recorded a verdict that death was due to an inadvertence on the part of the nurse, the jury adding that they could not attach blame to anyone. We do not doubt that the governors of this and other hospitals will take every step necessary to prevent a recurrence of such a tragedy. The accident is likely to accelerate the present general tendency of hospitals to face the additional cost of installing shock-proof equipment or of adapting existing equipment into shock-proof apparatus, a process which need present no great difficulty. In the meanwhile it is well to remember that the danger of high-tension shocks can be substantially reduced by the use of rubber-soled shoes or the provision of rubber or cork carpet on the floor. The fact that there have been in the past relatively few deaths from high-tension shocks in X ray departments, either in this country or abroad, is a tribute to hospital discipline and to the care exercised by the operators especially of portable sets where high-tension cables are less inaccessible than in stationary sets. It is clear that X ray work demands close personal supervision by an experienced technician, whether it be the medical radiologist in charge of the department, or the qualified radiographer working under his direction. The training laid down in the syllabus for the examination which admits to membership of the Society of Radiographers (M.S.R.) is not only a satisfactory test of knowledge of apparatus but gives a prestige which is likely to ensure obedience among the hospital staff. The letter by a State-registered nurse who is also a member of the Society of Radiographers on p. 777 points out clearly the advantages of insisting on skilled services for this important task. While it is clearly impossible for a radiologist to be present whenever an exposure is made, it would be wise for hospital authorities to insist that the apparatus shall never be worked except by a medical man or a qualified radiographer.

ANNOTATIONS

THE KETOGENIC DIET IN PUERPERAL PYELITIS

WHEN the ketogenic diet was introduced for the treatment of infections of the urinary tract by *B. coli*, it gave rise to hopes that one of the most familiar and persistent ghosts which haunt the out-patient clinic might at last be laid. It is perhaps too soon to judge how far this hope has been realised. Some of the earlier enthusiasm has certainly evaporated as the practical difficulties in inducing and maintaining ketosis in the adult have become apparent, and it is now realised that good results are not likely to be obtained unless the patient is willing to submit to the discipline of a dietetic ward. The patient who can be persuaded strictly to follow the régime at his home must have quite exceptional fortitude.

The observations on puerperal pyelitis reported elsewhere in this issue by Mr. A. T. Fuller, Ph.D., and Dr. Leonard Colebrook were obtained under ideal conditions. The diet was rigidly supervised, the bacterial content of the urine was carefully studied, and the degree of ketosis attained was measured by a simple modification of the nitroprusside reaction. Dr. Fuller had previously shown that the bactericidal effect of ketonuria is closely related to the concentration of β-oxybutyric acid in the urine and accordingly the attempt was made to establish a high degree of ketosis by cutting down the carbohydrate intake to the irreducible minimum of about 10 grammes a day. The trouble necessary to achieve this minimum is illustrated by the detailed description of the diets employed. To the normal man or woman who is accustomed to eating three or four hundred grammes of carbohydrate a day, a diet of this extreme type is not likely to be much more unpalatable than the more usual ketogenic diet, which provides about 30 grammes of carbohydrate a day, and it has the advantage of generating a much greater degree of ketosis. In the particular kind of infection with which the workers at Queen Charlotte's Hospital have to deal, this last point is specially important. It appears to be unusually difficult to establish ketosis in the puerperium, for in 20 of their 54 cases they failed to establish even a moderate ketosis. It would be unreasonable as well as unkind to blame human frailty for all these failures, although one or two desperately nauseated patients may have been disloyal. J. H. Burn and H. W. Ling have recently shown that the ease with which ketosis can be established in animals is modified by the activity of the anterior lobe of the pituitary. During human pregnancy ketosis can be provoked with unusual ease, presumably owing to overactivity of the pituitary, and it is possible that the contrary situation in the puerperium is due to a reactionary swing in the opposite direction. In those cases in which ketosis was satisfactorily produced Fuller and Colebrook found that the degree of improvement seemed to vary with the intensity of the ketosis. Better results might therefore be anticipated if the diet could be supplemented by oral administration of oxybutyric acid, or by subcutaneous injections of anterior pituitary extract. The latter alternative, of course, will not become practicable until suitable extracts become more generally available. Meanwhile, before advocating the general adoption of what is admittedly a tedious and expensive routine, it would be worth while ascertaining how the end-results of the ketogenic diet in puerperal pyelitis compare with those of the older and less troublesome treatment by drugs. It should not be difficult at Queen Charlotte's Hospital to collect detailed notes of a control series treated on conventional lines. Fuller and Colebrook say that patients treated by the methods in use before midsummer, 1932, became symptom-free, with subsidence of fever, though mostly the bacilluria remained during their stay in hospital; they quote observations made by G. H. Dodds on patients similarly treated which suggest that the urine eventually becomes sterile. The verdict after comparison of series of patients treated by different methods, one of which is so much more difficult to enforce than the other, is likely to depend on the remote after-history.

CAUDAL ANALGESIA IN YOUNG SUBJECTS

ANY form of anæsthesia which can be effectively applied to a child without leaving in his mind an unpleasant or fearful memory is worthy of note. We welcome therefore an account by M. F. Campbell of the successful employment of caudal analgesia,[1] which has hitherto, so far as we know, been but little used in operations on the young. The results obtained in

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[1] Jour. of Urol., August, 1933, p. 245.

83 cases are set out, 29 per cent. of whom were suffering from pyuria. Children under four are unsuitable subjects, the injection being technically impossible. The urological need for an anæsthetic in the young is usually for the performance of cystoscopy or of fulguration for papillomata. In girls the procedure is generally so painless as to require no anæsthetic unless in children of nervous disposition, in which circumstance a brief general anæsthetic is best. For boys over four years or so caudal analgesia has given excellent results: 13 of the patients were between four and six years of age, 51 between seven and nine, and 19 between ten and fourteen. In 67 of these little operations the anæsthesia was perfectly satisfactory, in 7 there was some discomfort, and in 9 a general anæsthetic was needed. In only one instance, a boy of seven, was there any unpleasant reaction. The child is given a preliminary hypodermic of gr. $\frac{1}{12}$ to $\frac{1}{8}$ morphia, according to age. A pillow is placed under the hips, and the site of injection is made insensitive by a hypodermic injection of 1 per cent. novocain. Then the large needle (21 gauge) is inserted through the insensitive area into the sacral canal, and 8 to 12 c.cm. of 2 per cent. novocain are injected. A quarter of an hour is then allowed to elapse before the operation is begun.

FRACTURES OF THE OLECRANON

SINCE the adoption of open operation in the treatment of fractures of the olecranon, the end-results have on the whole been most satisfactory. If the case is seen early, the fracture is not compound, and the fragment of the olecranon is not too small to make suture very difficult, the surgeon may confidently expect a return to normal function in the course of six to eight weeks, with an anatomical result little short of perfect. As regards the exact method used, there seem to be only two debatable points—viz., the material with which to effect apposition of the bone ends, and the period of time which should elapse before active movements of flexion and extension are commenced. It is true that some surgeons put the elbow in full extension after operation, others preferring a position of right-angled flexion; but provided exact replacement of the fractured ends has been achieved and is maintained without strain on the sutures, there does not seem to be any particular advantage of one position over another during the period of immobility. Flexion is not needed here to prevent the formation of excess bone in torn periosteum at the attachment of the brachialus anticus as in most fractures in and around the elbow-joint.

A discussion of the methods of treatment of these fractures, and of the results to be expected from each method, appears in the current issue of *Bone and Joint Surgery* from the pen of Dr. Ernest M. Daland. His remarks are based on observation of 48 cases of fracture of the olecranon, 24 of which have been followed up for periods of about a year. Almost every method of treatment was used, including simple plaster in extension, and union of the bone by five different materials. Eight of the patients were under 8 years of age, i.e., of an age before the appearance of the epiphyseal centre for the olecranon. Most cases occurred as the result of a fall, and often it was a matter for speculation whether the impact was received by the point of the elbow or by the hand. The conclusions drawn from this series are that closed reduction is unsatisfactory, but that all the standard methods of open operation give good results. Those tried were: 1. Suture of the torn fascia with chromic catgut (three cases), the elbow being kept in extension for three weeks. 2. Union of the bone ends by wire, nail, or bone peg (four cases). 3. Drilling of the bone and suture by kangaroo tendon (five cases). 4. Drilling of the bone and suture by means of strips of fascia lata (seven cases). Dr. Daland holds fascia lata to be the most satisfactory of all the suture materials he has tried. It gave perfect results in all the cases but one in which it was used, and that one fell into the hands of another surgeon who performed a secondary operation. Four of the six perfect results were, however, obtained in children, who undoubtedly respond better to treatment than do adults. Most of the patients who were treated by simple manipulation followed by the application of plaster were lost sight of. Since the displacement of the olecranon fragment is due to the pull of the triceps muscle, this method seems unlikely to be successful, and its adoption is surprising in even a proportion of cases in a modern casualty department. Early massage and movement Dr. Daland considers as important as the actual operation in assuring a good end-result; the suture material must therefore have firm tensile strength, and must be passed through the bone itself. Opinions differ about this question of early movement. Prof. Lorenz Böhler, in "The Treatment of Fractures," recommends leaving the forearm and elbow in plaster for four weeks after the operation. In the three cases of Dr. Daland's series in which union was obtained by suture of the fascia only with catgut, immobility in extension was maintained for three weeks, but all are reported as giving perfect end-results. In the technique of the operation, whatever the method used, the greatest care must obviously be taken not to damage the articular cartilage, and to obtain as accurate alignment as possible along the articular surface.

ACTIVE IMMUNISATION AGAINST FILTRABLE VIRUSES

ALTHOUGH two of the oldest examples of artificial active immunisation are to be found in the group of virus diseases—e.g., small-pox and rabies prophylaxis—there still remains much to be done in this field. It may be comparatively easy to produce an active immunity to this or that virus under experimental conditions in the laboratory by relatively harmless means, but it is another matter to devise methods applicable to man which are at once practical, effective, and devoid of risk. Virus which has been rendered inactive by treatment with formalin retains some of its antigenic value, and can be used as a vaccine, as many workers have shown, but the immunity produced by such a vaccine is neither solid nor durable enough for practical purposes. Formolised virus may, however, be used to prepare the way for a vaccine composed of active virus, as in the method evolved by Laidlaw and Dunkin for the prevention of distemper in dogs. Veterinary medicine supplies us with examples of another method of active immunisation which has proved its value in the field in the control of swine fever and rinderpest; it consists in the simultaneous inoculation, either together or separately at different sites, of antiserum and active virus. The method of vaccinating against yellow fever devised by W. A. Sawyer, S. F. Kitchen, and W. Lloyd[1] depends on this principle, and laboratory workers engaged on yellow fever work, both in America and this country, have been protected by this means. The procedure would appear to be devoid of risk but in fact unpleasant reactions may occur. Considerable interest therefore attaches to the recent work of J. Lignières,[2] who has devised a method of immunisation with antiserum and active virus which depends on making a small area of skin resistant by infiltrating it with serum and implanting virus in this area. This technique has the definite advantage over its predecessors that it requires much less serum. Lignières claims that by its use a solid immunity can be produced and that reactions do not occur, but he issues a warning against hasty generalisations from his experiments which have been confined to three viruses and require to be repeated on a more extensive scale. It is significant, however, that G. M. Findlay[3] independently has attempted the immunisation of monkeys against yellow fever by a similar method and reports success.

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[1] Jour. Exper. Med., 1931, lv., 945.

A CZECHOSLOVAK VIEW OF HEALTH INSURANCE

IT is a tribute to the British national health insurance scheme that although it has been in operation for 21 years it has inspired very little controversial literature. Apart from official documents and legal text-books the writings of any kind on the subject in the English language make but a small bibliography. The position is different in Central Europe, where the expenditure of energy and ink in attacking and defending health insurance has been profuse, as is shown by the long list, covering 56 pages, of publications, nearly all in German, appended to Dr. Gisela Augustin's monograph on the medical aspect of social insurance in different countries.[4] Dr. Gottlieb Pick in his latest book[5] gives a thoughtful review of the more important problems of health insurance as they reveal themselves at the present time in the chief European countries. He regards the subject mainly, but by no means exclusively, from the point of view of the medical practitioner. His chief interest is in the effect of health insurance on the practice of medicine, and he concludes that in Germany, Austria, and Czechoslovakia at all events its influence has, on the whole, been unfortunate. He thinks that in those countries the insurance doctors have for the most part been subjected to a bureaucratic control which has endeavoured to apply to medical practice the mechanical methods of "Taylorismus"—rationalisation—characteristic of modern industrial development; and that in consequence the intimate personal relation of doctor and patient has been impaired, the doctor has been deprived in large measure of the zest and satisfaction that come from the exercise of an unhampered professional activity, and the quality of the medical service given has, to say the least, not been enhanced. That these bureaucratic methods are not necessary in insurance practice is, Dr. Pick contends, shown by the success of the British system, in which the doctors work under four conditions that he regards as essential in any scheme of insurance medical service: (1) administration of medical benefit by a body not connected with cash benefits; (2) free entrance of any qualified doctor into insurance practice; (3) free choice of doctor; (4) participation of the doctors in the administration of medical benefit.

As regards the freedom of insurance practice from bureaucratic control, Dr. Pick contrasts Russia, where the insurance doctors are whole-time salaried officials, with France, where the doctor is in no relation to the lay insurance authorities, and receives his fees not from them but from his insured patients direct. As regards the kind of medical treatment given, Dr. Pick again refers to Russia, this time contrasted with Great Britain. In Great Britain medical benefit is limited to a service of general practitioners; in Russia, 30 per cent. of the insured persons receive some form of institutional treatment every year. But, he states, of the persons so treated not more than about 5 per cent. are restored to health—a result that he attributes to the lack of proper conditions of public and domestic hygiene, without which no provision for curative treatment can be permanently effective. Dr. Pick has much to say about the difficulties of certifying incapacity for work, which form a fruitful source of misunderstandings between the medical and lay workers in the field of health insurance—misunderstandings which are evidently just as acute and as prevalent in Russia, with its system of salaried official doctors, as in countries where the insured persons have free choice of doctor. He thinks that lay administrators tend to formulate rigid standards of incapacity and expect doctors to apply them with mechanical uniformity in giving certificates, ignoring the fact that such standards cannot be applied in clinical practice without wide allowances for individual patients. His thesis would have been more helpful if he had put forward some definite constructive proposals for dealing with this difficult question. His statements are not always accurate; he says, for example, that in Great Britain the insured persons can change their doctors once only during the year, and that sickness benefit is not payable until the eleventh day of incapacity. But he writes with exceptional lucidity, and since he conveys the views prevalent among many continental doctors on health insurance at the present time, his work is well worth attention.

THE EPILEPTIC AURA

THE literature of epilepsy abounds with reports of single cases or small groups, or of large groups of institutional patients who are mainly defectives—physical or mental. Dr. W. G. Lennox and Dr. S. Cobb followed what may be a more productive idea in setting themselves the work of collecting and collating data from private practice. They have sent questionnaires to many members of the American Neurological Association and of the Association for Research in Nervous and Mental Diseases, and have received useful records of 1359 non-institutional patients suffering from epileptic seizures. Their first study of these replies deals with the aura.[1] Rather more than half the patients (764, or 56·2 per cent.) showed aura, and the incidence was slightly greater among women, but there was little differenc between the "symptomatic" and the "essential" groups, i.e., those with and without a history o mental abnormality or brain injury. The autho point out that the presence of an aura is really t ability to remember, as there is no certain objecti proof that an aura has been experienced. As mig be expected, aura was a more frequent accompa ment of grand mal than of petit mal: 51 per ce and 42 per cent. respectively. Gowers, who a found aura in about half his cases, suggested t it was more frequent—or more frequently reme bered—among intelligent patients. In the pres series this finding was confirmed, but the results were complicated by the longer duration of epilepsy in the mentally defective patients. There was an increase in the incidence of aura with the passage of time, presumably on account of the greater total number of seizures and the resulting greater likelihood of experiencing aura. Thus at first sight the long-standing mentally defective patients seemed to have more aura than the intelligent ones with shorter histories. The increase in the incidence of aura with the passage of time was more pronounced in the "essential" than in the symptomatic group.

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[2] Bull. Acad. de Méd., 1933, civ., 738.

[3] Bull. Office internat. d'hyg. pub., 1933, xxv., 1009.

[4] Die Arztfrage in der deutschen und ausländischen sozialen [illegible] Berlin, 1931. Reviewed in THE [illegible]

[5] [illegible] r Sozialversicherung. Brünn: Rudolf M. [illegible] 96.

[1] Epilepsy, xiii., Aura in Epilepsy: a Statistical Review of 1359 Cases, Arch. Neurol. and Psychiat., 1933, xxx., 374.

The various forms of aura described by the patients are listed and classified. The mentally deteriorated patients were more liable to visceral aura and the mentally normal to pain, paræsthesia, or numbness. Aura was very seldom the pleasant experience described by Dostoievsky; epileptic seizures do not seem commonly to be a means of escape. The expression most often used was "dizziness," meaning a feeling of stupidity or confusion. In fully half the patients the aura concerned the mental state, either the general feeling of mood, or the head. Of the bodily aura, the largest group, 18·7 per cent., was referred to the digestive tract. One theory of epileptic ætiology is vascular spasm of cerebral vessels, and it is therefore interesting to learn that 7·9 per cent. of these patients had aura signifying changes in circulation, temperature, or activity of the sweat glands. Only 3·2 per cent. mentioned changes in respiration or salivary activity. Paræsthesias and numbness were described by 11·1 per cent., visual disturbances by 9·2 per cent., and aural disturbances by 2·4 per cent. Muscular movements warned 14 per cent., but in many instances these were without localising value. Aura of probable cortical localising value was present in 41 per cent. of the "essential" and 70 per cent. of the "symptomatic" cases.

TANNIC ACID IN STABLE SOLUTION

ONE of the recognised drawbacks to the use of tannic acid for first aid is its instability in the dilute solution used for treatment of burnt or scalded surfaces. In a large hospital with a staff of dispensers this is not a serious inconvenience, but in smaller hospitals, factories, and in the home, where the call for first aid is relatively rare but very urgent, it may cause delay in application. In a paper read at the British Pharmaceutical Conference in July W. A. Woodard and A. N. Cowland, two members of the dispensing staff of St. Thomas's Hospital, show that the deterioration of the usual 2 per cent. solution of tannic acid is not due, as has been stated, to a spontaneous hydrolysis into gallic acid and glucose, but to the action of moulds which develop in solutions which were not originally sterile or have become contaminated during use and storage. They have not only studied the behaviour of solutions made rom tannic acid from various sources under varying conditions of storage, but have shown how difficult it s to hydrolyse an average sample of gallotannic acid. The results of the action of moulds growing in solutions containing no preservative are variable, depending presumably on the species of mould with which the solution has become inoculated, but after trying several preservatives Woodard and Cowland have obtained very encouraging results with one part of mixed ortho-, meta-, and para-cresols in 250 parts of the usual 2 per cent. solution of tannin, which they find much more satisfactory than the more usual 1 in 2000 mercuric chloride. They consider that it should be possible for the public to obtain stable solutions of this useful preparation from pharmacists for first-aid treatment of burns and scalds, and give also a useful formula for tablets which can be dissolved for emergency cases.

THE BLOOD LIPOIDS IN ANÆMIA

THE significance and interpretation of the disturbance of cholesterol and lecithin metabolism which frequently accompanies anæmia is not at present clear. G. L. Muller showed in 1930[1] that in Addisonian pernicious anæmia the cholesterol and in many instances the plasma lecithin phosphorus are decreased during a relapse; and a similar dramatic rise in the blood lipoids accompanies the reticulocyte crisis which inaugurates a remission. There is apparently no such clear relationship between the blood picture and the blood lipoids in other forms of anæmia. Muller and C. W. Heath[2] have more recently studied the behaviour of the lipoids in a series of 61 cases of hypochromic anæmia of various types. In anæmia due to acute loss of blood the lipoids remained at normal levels or were high. In anæmia due to chronic loss of blood, on the other hand, they tended to be low at the height of the anæmia but increased after the reticuloyte response had subsided. This is in marked contrast to their behaviour in Addisonian pernicious anæmia. In idiopathic hypochromic anæmia, with or without the association of a faulty diet, no consistent results were obtained. In some cases the lipoids were within normal limits throughout, in others they were subnormal, being highest at a time when the anæmia was most severe. In a further small group there was a definite rise before the reticulocyte response to iron had subsided. In aplastic anæmia the lipoids were high in spite of severe anæmia. These conflicting results suggest that the hypothesis that anæmia per se is directly related to the level of the cholesterol and lecithin phosphorus in the blood will not hold.

INTRANUCLEAR INCLUSION BODIES IN BRAIN TUMOURS

LAST year Dorothy S. Russell[3] published the observation that intranuclear inclusion bodies, indistinguishable from those characteristic of sundry virus diseases, are present in a large proportion of the gliomas. This finding has now been confirmed by Abner Wolf and Samuel T. Orton,[4] who have noted the presence of these bodies also in some other tumours, notably meningeal fibroblastoma, perineural fibroblastoma, and hæmangeioblastoma. It is therefore clear that they are to be found in benign as well as in malignant tumours. These observations inevitably focus attention once more on the theory that filtrable viruses play a part in the production of cancer, though the greatest caution is required in interpreting their significance. The fact that these intranuclear bodies are occasionally seen in organs recovered at autopsy from subjects without clinical evidence of infection suggests the possibility that their discovery in tumour tissue may also represent a chance infection with some non-pathogenic virus. Another possibility must also be entertained, namely, that these intranuclear inclusion bodies are not diagnostic of the activity of a virus. But on histological grounds it seems clear that they cannot be interpreted as the result of any recognised type of degeneration, and there is no clear alternative to the virus theory of their causation. If justification were needed for the active pursuit of cancer research along the path of filtrable viruses, these observations would supply it.

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[1] Amer. Jour. Med. Sci., 1930, clxxix., 316.

[2] Arch. Internal Med., 1933, lii., 388.

[3] Jour. Path. and Bact., 1932, xxxv., 625.

[4] Bull. Neurol. Inst. New York, 1933, iii., 113.

SURGICAL TREATMENT OF HYPERINSULINISM

THE syndrome associated with hyperinsulinism or "spontaneous hypoglycæmia" is usually characteristic enough to be readily recognisable. The occurrence of symptoms such as sweating and incoördination[1] during a hunger period, and their rapid relief by the taking of food, is strongly suggestive, and the diagnosis can be confirmed by estimations of the blood-sugar. More rarely, however, there are symptoms indicating severe organic nervous disease or psychic disturbance, and these may lead the observer astray. A. Wolf, C. C. Hare, and H. W. Riggs[2] describe two cases of this kind. In the first of them—the patient was a boy of 10—a prolonged aura of malaise and restlessness was succeeded by epileptiform seizures, resolving ultimately into status convulsus which proved fatal, and at autopsy multiple adenomata of the pancreas were found. Retrospectively it could be seen that the seizures had not been typical of epilepsy, though suggestive of the idiopathic type, and that they came on most often after a fasting period, in the early morning, or immediately before the noon meal. In the second case, manic attacks were associated with convulsive phenomena and coma; there was also transient recurrent hemiplegia with evidence of pyramidal tract involvement, pupillary changes, and mental confusion. Estimation of the blood-sugar here showed values of from 40 to 70 mg. per 100 c.cm., and glucose therapy gave striking relief.

Whilst there is every sign of hyperinsulinism being better known and more generally diagnosed during life, the treatment remains very much in its infancy. The milder cases may be found to respond well to frequent feeding with carbohydrate, and with constant care symptoms may thus be almost eliminated. But there are obvious disadvantages to a regimen of consistent overfeeding with carbohydrate and often it fails to control symptoms at all permanently. When this is so, surgical intervention seems to be reasonable. If inspection of the pancreas shows the presence of carcinoma of the islands of Langerhans with multiple metastatic nodules, the condition will be beyond surgical aid, but if a localised tumour of islet tissue is found, complete removal and cure may be possible and should certainly be attempted. E. S. Judd, F. N. Allan, and E. H. Rynearson[3] report the results of treatment in eight cases operated upon in the Mayo Clinic. In one of these a carcinomatous growth was found which proved inoperable owing to the presence of secondary nodules in the liver, while in two others nodules were removed from the pancreas and were found to be tumours of the islands of Langerhans, showing evidence of malignancy. In both these cases the patient has been free from symptoms of hypoglycæmia since the date of operation (September and October, 1931, respectively). In the remaining five cases either there was evidence of chronic interstitial pancreatitis or there was an apparently normal pancreas. The capsule of the gland was stripped in one instance (in which the pancreas was reduced to approximately half the normal size), and in the other cases a portion of the gland (from 5 to 14 g.) was resected. In none of these was there more than temporary relief of the hypoglycæmic symptoms. In discussing the surgical technique adopted, the authors of the paper emphasise the prime necessity of an incision that gives an adequate exposure; they themselves advocate a long left rectus incision, though the T-shaped incision advised by the Finneys also appears to be satisfactory. The pancreas was exposed through the gastro-hepatic omentum, and in resecting the gland the body was grasped with a pair of De Martel intestinal clamps and lifted from its bed, the surrounding tissues being separated and pushed back, with control of bleeding. Removal of a tumour can be effected by dissecting it from the surrounding tissue, or by resection of the whole of the tail of the pancreas when the tumour is situated in this area. The cut surface was closed by suture, or clamps left on the remnant of the pancreas, thus serving as a drain. The danger of a pancreatic fistula persisting appears to have been somewhat exaggerated, since in one case only was there a fistula for any length of time, and healing was subsequently complete.

It is possible that in cases where no definite tumour is found better results would be obtained by more extensive resection of the gland, on the analogy of thyroidectomy. It has certainly been established that operation should be attempted in suitable cases, for the possibility of finding an operable tumour fully justifies laparotomy.

THE IRISH HOSPITALS COMMISSION

THE names of the members of the Hospitals Commission, set up under the provisions of the Public Hospitals Act, 1933, of the Irish Free State, were announced last week. They are Mr. M. W. Doran (chairman), Dr. Joseph O'Carroll, Dr. J. A. Madden, Mr. Liam O'Doherty, and Mr. Denis Allen. Mr. Doran, Mr. O'Doherty, and Mr. Allen constitute the present Committee of Reference, the duties of which will probably now merge in that of the Commission. Dr. O'Carroll was a consulting physician in Dublin until his retirement a few years ago. He was physician to the House of Industry Hospitals and professor of medicine in University College, and has held office as president of the Royal College of Physicians of Ireland. Dr. Madden is a practitioner in Westport, Co. Mayo. He and Mr. Allen have been members of the *Dáil* in the past, although Dr. Madden did not take his seat. Mr. Doran, the chairman, is an engineer, and Mr. O'Doherty is one of a firm of accountants in Dublin. The Commission has the widest powers to investigate and report on the whole hospital and nursing system in the Irish Free State.

As announced in our Medical Diary, Sir StClair Thomson is giving a presidential address to the historical section of the Royal Society of Medicine on Wednesday. His subject is the present-day need for the study of the history of medicine, and we understand that the meeting is open to any who are interested in the subject.

SOCIETY OF CHEMICAL INDUSTRY.—The food group of this society has arranged for a symposium on Bread and Milk to be held in London on Thursday and Friday, Nov. 23rd and 24th, at B.M.A. House, Tavistock-square, W.C. Prof. W. W. Jameson, dean of the London School of Hygiene, will take the chair at the first session, Sir John Russell, F.R.S., at the second, and Prof. H. E. Armstrong, F.R.S., at the third, and authorities from a number of countries have been invited to take part. The proceedings will end with a dinner at the Trocadero Restaurant when Mr. L. H. Lampitt, D.Sc., chairman of the group, will preside, and Sir Hilton Young, the Minister of Health, will be the principal guest. Non-members of the society who wish to attend the meeting should write to the general secretary at 46, Finsbury-square, London, E.C.2.

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[1] See THE LANCET, 1933, i., 533.

[2] Bull. Neurol. Inst., New York, 1933, iii., 232.

[3] Jour. Amer. Med. Assoc., July 8th, p. 99.

SPECIAL ARTICLES

ENTERIC FEVERS IN GREAT BRITAIN

RECENT OUTBREAKS AND THEIR LESSONS

BY NEVILLE M. GOODMAN, M.D., D.P.H.

THE ebbing tide of enteric fever allows of a closer study of the lagoons and pools which are left behind it. From being a cause of death so common as almost to be a "natural" one, at the present time less than half as many persons in England are notified as dying every year from enteric fever, as, for example, from leukæmia or from progressive muscular atrophy, and more than 23 times as many are killed annually by motor transport. In 1871 the death-rate from enteric fever per million of the population was 371; in 1931 it was 6. Fig. 1 shows how this fall has occurred. Its stages and probable causes have been admirably expounded by Sir George Newman.[1]

THE DECLINE

In assessing the factors associated with this decline it would be unwise to be dogmatic, but the general view that the fall between 1875 and 1885 was chiefly dependent on great activity in providing the larger towns with pure water and good drainage seems likely to be correct. Then came a pause of 15 years until the recognition and attempted control of other sources of infection than contaminated water- and milk-supplies may have accounted for the resumption of the fall. Sir Charles Cameron suggested in 1880 that oysters from Dublin Bay were the vectors of typhoid fever, and in 1894 Brighton, under the leadership of Dr. (now Sir Arthur) Newsholme, sought in vain to obtain powers to control layings.[2] The disastrous outbreaks after mayoral banquets at Winchester and Southampton in 1902 were needed to drive home the lesson and force legislative and administrative action which has now rendered the native (but not the continental) oyster safe—a safety reflected alas in its price.

At the same period Hartley and Koch emphasised the importance of the "carrier" in spreading infection, and the great improvement in personal hygiene and cleanliness resulting from the rise in the standard of living and from educative measures is generally considered to be largely responsible for the fall in the death-rate which has continued (save for a slight halt immediately following the war) up to the present day.

Additional reasons for the steady fall may be sought in the introduction of chlorination of water-supplies by Sir Alexander Houston following the Lincoln epidemic in 1905, for which the world owes him a debt of gratitude which can never be repaid; the introduction of pasteurisation of milk; the recognition of the rôle of ice and ice-cream, watercress, and other foods; better laboratory facilities for diagnosis; the increasing practice of isolating cases and the introduction of preventive vaccination. Apart from the mass inoculation of our troops in the world war the last-named measure has not been much employed in Great Britain except during some local epidemics, but in the southern States of America, for example, it is considered to be the major prophylactic measure among the rural negro population,[3] and in continental countries in which wholesale vaccination is practised on the conscripts it is said to have altered the sex-incidence[4] just as infantile vaccination against small-pox has altered the age-incidence in that disease. In any case the question of antityphoid inoculation is in the melting pot at the moment because of the recent work on the varying protection afforded by different strains. That all is not well has been illustrated by a recent epidemic in India in which 14 out of 18 cases, including three fatal ones, had been fully inoculated within the previous seven months.[5]

The fact that the case-incidence rate shows a fall similar to that of the death-rate indicates that a true reduction of the disease has occurred, and that the fall in the death-rate was not merely due to a decreased virulence or a change in type towards paratyphoid with its lower death-rate. The relative incidence of paratyphoid to typhoid has risen steadily since 1911, when the distinction was first made; it was about 15 per cent. in 1927 and about 26 per cent. in 1930. How much of this apparent increase is due to better diagnosis it is impossible to say without knowing the proportion of cases in which a bacteriological diagnosis was made. It is perhaps noteworthy that in Germany the case-incidence of paratyphoid and typhoid is approximately equal.

Interesting confirmation of the efficacy of measures of general sanitation in reducing the incidence of enteric fever may be found by analysing the relative incidence on the large towns and on the smaller towns and country districts. Fig. 2 shows that whereas in 1911 the rate for the county boroughs exceeded and for the rural districts was less than that for the whole of England, about 1915 these rates were reversed and have remained so up to the present time. The rate for non-county boroughs and urban districts—i.e., small towns—has been constantly above the general average since 1911. Thus we find that—

> in the nineteenth century enteric fever not uncommonly caused a mortality in towns as high or even higher than in rural districts. Following the introduction of efficient methods for the protection of city water-supplies during the latter part of that century and the beginning of this, typhoid mortality decreased rapidly and became more equal in towns and rural districts. With the improvement of rural sanitation and conditions of life, rural rates of typhoid mortality in some countries have again become lower than urban rates. . . . While this experience has been shared by Scandinavia, Denmark, and Holland, it is not unfortunately by any means true of all the countries of Europe. Many cities in Europe and America continue to show a relatively high morbidity and mortality-rate from this disease.[6]

RECENT YEARS

Have we then reached a position in Great Britain where the enteric fevers have so far fallen from their great position as to be practically negligible? Are the outbreaks which have occurred in recent years the last flickerings of a dying fire, and is the long struggle to curb man's persistent habit of polluting his food and drink with his own excrement within sight of victory?

In the twelve years 1921 to 1932, 36,735 cases of typhoid and paratyphoid fever were notified in England and Wales. In eight of these years (figures are not available for the remainder) medical officers of health reported 225 outbreaks to the Ministry of Health. Of these 225 reported epidemics, some 43 have been considered worthy of special mention in the annual reports to the Chief Medical Officer of the Ministry of Health, while four, those at Bolton-upon-Dearne, Chorley (Lancs), Hertfordshire, and Malton were the subject of a special report.[7] These 43 epidemics deal with a total of 3009 cases.

Nine (856 cases), of which two (34 cases) were paratyphoid B, were attributed to contaminated water; ten (769 cases), of which three (515 cases) were paratyphoid B, were attributed to milk; eighteen (1126 cases), of which twelve (794 cases) were paratyphoid B, were attributed to food, including cream, ice-cream, pressed beef, tongue, watercress, and confectionery; four (186 cases), of which three (137 cases) were paratyphoid B, were attributed to contact, the cause of the primary case being untraced; one (12 cases) was due to shell-fish (mussels); and two (60 cases, 45 being paratyphoid B) were untraced. It will be noted that a far higher proportion due to paratyphoid B are found in the "food" group than in the water- or milk-borne ones, and it should also be realised that the epidemics attributed to food are far less often definitely proved to be so, and have been based on assumption much more than those due to water or milk. Of the "contact" group, one occurred in a small rural community by direct spread from unrecognised cases among returned hop-pickers; the others occurred in a general hospital, a boys' school, and a hospital for children, also as the result of unrecognised cases. These epidemics do not of course give a complete picture of epidemic typhoid in England, since they are selected because of their epidemiological or other importance. Thus, for example, small epidemics are also of comparatively frequent occurrence in mental hospitals, owing chiefly to the great difficulties in diagnosis and in preventing direct spread.

THE MALTON EPIDEMIC

It might next be profitable to inquire, in those outbreaks in which fuller information is available, as to the actual points at which the defences broke down, in order to see whether it would have been possible to avoid the disastrous consequences. For the consequences are often disastrous indeed. If we take the epidemic which occurred last autumn at Malton in the North Riding of Yorkshire as an example it would not be untrue to say that this small town has been dealt an almost crushing blow. Although only some 5 per cent. of the population were attacked and the deaths numbered but 23, and although the source of infection was immediately traced and the local authority took effective steps to prevent any more cases occurring, such was the ignorance and panic not of the inhabitants but of some of their neighbours and visitors that in addition to the trials and cost of the epidemic Malton has had to suffer a partial boycott the effects of which have by no means yet been made good. Thus the weekly market has not yet recovered, the number of "teas" provided at a hotel is one-tenth that of the previous summer, and it seems possible that the hunting patronage will not return this winter. Financially it has been estimated that each death from typhoid costs the community £2000[*] (Whipple), and in Malton an immediate advance of 2s. 3d. on the rates has been required.

The progress of such an epidemic as reflected, for example, in the columns of the local newspaper is a fascinating and moving spectacle. The first hints of trouble . . . . an emergency meeting of the town council . . . . a statement by the medical officer of health that the disease is probably water-borne . . . . the town crier . . . . taking over the cottage hospital . . . . one man loses his head and wires to the Prime Minister (the reader almost cheers when he turns out to be a foreigner!) . . . . the arrival of an expert from the Ministry of Health . . . . chlorination . . . . the first deaths . . . . the broken drain located . . . . indignation at the boycott alleged to be fostered by tradesmen from neighbouring towns . . . . fantastic stories of ladies refusing to drive through the town in a closed car, and of persons being immediately asked to leave shops in York or Scarborough on giving an address near Malton . . . . per contra, offers of help and a relief fund . . . . the search for more accommodation in neighbouring fever hospitals . . . . wholesale inoculations . . . . the worst over . . . . some mutual recriminations . . . . the resentment of everybody over the popular press exploiting the occasion for sensational "stunts" . . . . the struggle back to normality . . . . the wish to be left alone to recover.

The causes of the outbreak are to be found in the report [8] to the Ministry of Health. A brief recapitulation will be sufficient. A farm labourer was admitted to the Malton public assistance institution on Sept. 23rd, 1932. He was suspected to be a case of typhoid fever, but he continued to use the water-closet in the ward, and no special precautions were taken to disinfect the stools, partly because the nursing staff did not clearly understand their instructions, partly because the patient was "difficult" and the nursing staff inadequate, and partly because the diagnosis remained in doubt until Oct. 9th when a second Widal test was reported as positive, the first having been negative. On Oct. 24th notifications indicative of a severe water-borne outbreak began to come in. Dr. W. V. Shaw (who had a previous knowledge of the locality) arrived from the Ministry of Health on Oct. 25th and with his help it was discovered that the drain from the institution was broken, and that owing to a peculiar accident of the geological formation it seems highly probable that a specific infection had occurred of the Ladywell, an ancient shallow well forming the source of the town's water-supply and situated about 250 yards distant.

While it is true [9] that the Ladywell had been condemned as long ago as 1893, and that the sewage system of the town was unsatisfactory, neither of these facts was relevant to the recent outbreak, the source of pollution having been different and unsuspected by anyone. It is also true, of course, that the outbreak might have been prevented at any one of a number of points—e.g., by removal of the original case to an isolation hospital, or by proper supervision of the disinfection of the stools, or, finally, by previous "sterilisation" of the water-supply. On the other hand, the Malton epidemic provides ample reason for saying that "there, but for the grace of God," go a large number of our small towns. With a water-supply and sewage-disposal system sometimes practically unchanged since Roman days; with no provision for the enforcement of regular inspection or analysis; with not much money and less inclination to carry out improvements, it is no wonder that the enteric fever-rates of our small towns and rural districts are above the average. It is greatly to be hoped that county councils will everywhere use the powers given them under the Local Government Act of 1929 to survey and make grants towards the water-supplies and sewage systems of their county districts.[10]

OTHER WATER-BORNE EPIDEMICS

As regards the eight other water-borne epidemics in the period under review, the Bolton-upon-Dearne outbreak in 1921 occurred in two waves, the first being probably due to a specific infection of the gathering ground of the Dearne valley colliery water-works which supplies the district, the exact source being unknown, but the casual excreta of persons gathering brushwood being a possible medium. The second wave affected only the village of Bolton-upon-Dearne and was due to heavy pollution of the local wells by the original cases, the freshly chlorinated main water-supply being insufficient for the needs of the village. Secondary cases occurred in the neighbourhood for as long as two years following the outbreak.[11]

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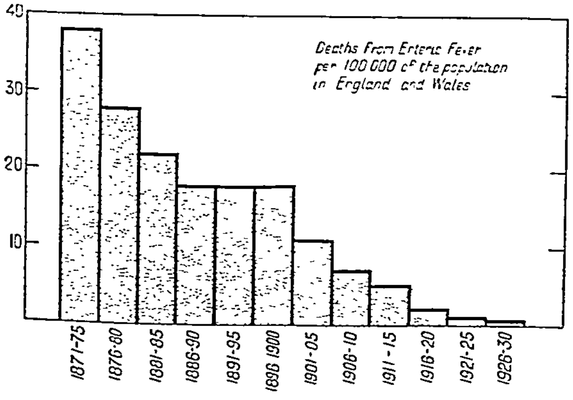
[*] This, of course, includes non-fatal cases.

The epidemic last autumn at Denby Dale, also in the West Riding, was due to specific infection from a case in a small group of houses, the sewage from which entered a stream from which in turn water contaminated a spring (which was one of the sources of supply to the village) by an old drain which had been overlooked.[12]

In the remaining water-borne epidemics the sources of infection were probably due to: (1) displacement of sewers by subsidences from coal-mining; (2) a well contaminated by the improper disposal of the contents of pail-closets; (3) drinking water from a land drain outfall contaminated by a deficient sewer; (4) the infection from an unknown origin of one boring of a deep chalk well; (5) the surface pollution of part of a complicated system of water-supply to a very ancient town; (6) a large party of school-children drinking from a stream which receives untreated sewage effluent; also a number of persons camping who did the same.

FIG. 1

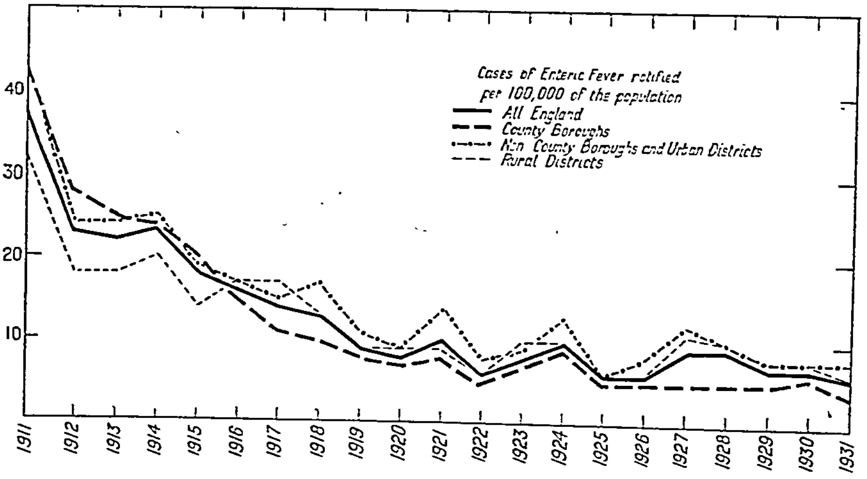


It should be realised that the specific pollution of a water-supply is not necessarily followed by an explosive epidemic. There is some evidence that apparently scattered and sporadic cases of enteric fever may occur from occasional or repeated specific pollutions.[13] The recent work with Wilson and Blair's medium on the isolation of the bacteria of typhoid and paratyphoid from sewage has shown their comparative ubiquity, and the reasons why "there are so few typhoid outbreaks despite the apparent liability to mass infection" are still quite unknown.[14]

NON-WATER-BORNE EPIDEMICS

In the ten milk-borne epidemics, the most notable, those at Chorley in Lancashire in 1924 and in western Hertfordshire in 1927, were both due to cases of paratyphoid fever on farms, in the latter unrecognised, in the former recognised but not isolated. Of the rest two were due to the use of polluted water for washing utensils, the remainder to unrecognised cases or carriers on farms or dairies. While pasteurisation is of course an independent safeguard, the disaster at Montreal in 1927 (5353 cases) shows that pasteurisation is by no means fool-proof.[15]

FIG. 2



The other modes of infection do not call for comment here, except to suggest that as regards food an improved hygienic standard in its handling and preparation is perhaps a more efficient prophylaxis than the routine examination of food handlers, as attempted in the United States.[16]

Are there possibilities of an increase in typhoid infections in the near future? Such an increase might occur through relaxation of sanitary control, through a change in virulence of the bacilli, or through an alteration in the habits of the people. The first is not likely, and the second is purely problematical, although a warning has been sounded that there are some indications of a higher case-incidence,[17] as shown, for example, at Egham in 1928, where a small epidemic spread by cooked tongue gave an attack-rate of 100 per cent., and at Hartlepool in 1929 in a series of 40 cases due to dressed crab. As regards a change in the habits of the people it is quite possible theoretically that the large increase in "hiking" and camping may be accompanied by a higher incidence of enteric fever unless the sanitary control of camping sites and education in the proper disposal of excreta is undertaken. There are, however, no actual indications of any such increase.

CONCLUSIONS

1. The enteric fevers in Great Britain have diminished, are diminishing, and should continue to diminish.
2. Deaths and incidence have shifted from the large towns to the smaller towns and rural districts.
3. Epidemic incidence is chiefly due to water and milk in the small towns and rural districts, and to specifically infected foods in the large towns.

4. Water-supplies and the disposal of sewage are still unsatisfactory in many urban and rural districts, and county authorities should exercise the powers they now possess of supervising and aiding the smaller sanitary authorities.

5. Van-dwellers, campers, and the like are at present a weak point in the sanitary defences.

6. Control must remain dependent primarily on early and accurate diagnosis—i.e., on the general practitioner in the first instance. Except in the case of suspected carriers, clinical observation is still more important than laboratory tests.

7. Control by the sanitary authorities is a matter for constant vigilance. The golden rule for local sanitary authorities must be to make their area so hygienically "safe" that even a number of undetected cases should not cause an epidemic.

8. "Psychological" management is an important aspect of an epidemic. For example, if an even choice lies between chlorination of the suspected water and an alternative supply the fresh supply should be chosen on psychological grounds. Information, instruction, and propaganda are needed, and the general plans for this may with advantage be prepared beforehand.

9. Preventive inoculation is chiefly of value in those exposed to special risks. It is not proved that wholesale inoculations during the course of the epidemic have any real effect; statistics in such cases are always ipso facto favourable to inoculation.

10. The greatest safeguard lies in the cultivation of a national, local, and personal hygienic sense which will realise that enteric fever (to quote Sir George Newman) "is definitely preventable and should be prevented," and will not stint the measures necessary to that end.

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MEDICINE AND THE LAW

Insulin and Motorists

AN interesting case decided by the Watford magistrates last week indicated the possible effect of insulin treatment in relation to the offence of driving a motor vehicle while under the influence of a drug. According to medical evidence called for the defence, the patient's life was saved by insulin in 1923, and that treatment had continued ever since. A few months ago he entered a nursing-home for special treatment, the injections being increased. When he left the home the doses were decreased; the patient's wife made the injections under medical direction, and was instructed as to the use of the antidote if required; the patient himself had no reason to suppose he would be overtaken on the particular occasion which led to the police proceedings. Dr. G. Graham, of Harley-street, stated that the patient would generally have ample warning of any reaction; the condition on the day in question might be due to the fact that improvement was taking place more quickly than the patient realised. The police evidence was that the patient, a motorist since 1919 with a clean record as a driver, drove from Watford to Rickmansworth. There were two lines of traffic, and he drove, almost at a walking pace, between them. In doing so he collided with three vehicles on his off-side; the drivers shouted at him but he did not stop; he afterwards collided with the rear of a stationary van, his car skidded, and came to a standstill on the pavement. A constable found him to be in a dazed condition, only half-conscious of what was said to him; the police surgeon certified that he was suffering from insulin and was unfit to drive a car. Various charges of dangerous driving and of driving without due care and attention were framed but were not proceeded with; the defendant, who had already handed his driving licence to his solicitors and had offered to surrender the licence for 12 months, pleaded guilty to the charge of driving while under the influence of a drug, which is an offence under Section 15 of the Road Traffic Act of 1930. The magistrates fined him 5*s*., and ordered him to pay £8 10*s*. costs; his licence was suspended for five years, but he was informed that he might apply for a revision of this suspension after six months if medically fit.

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4. Water-supplies and the disposal of sewage are still unsatisfactory in many urban and rural districts, and county authorities should exercise the powers they now possess of supervising and aiding the smaller sanitary authorities.

5. Van-dwellers, campers, and the like are at present a weak point in the sanitary defences.

6. Control must remain dependent primarily on early and accurate diagnosis—i.e., on the general practitioner in the first instance. Except in the case of suspected carriers, clinical observation is still more important than laboratory tests.

7. Control by the sanitary authorities is a matter for constant vigilance. The golden rule for local sanitary authorities must be to make their area so hygienically "safe" that even a number of undetected cases should not cause an epidemic.

8. "Psychological" management is an important aspect of an epidemic. For example, if an even choice lies between chlorination of the suspected water and an alternative supply the fresh supply should be chosen on psychological grounds. Information, instruction, and propaganda are needed, and the general plans for this may with advantage be prepared beforehand.

9. Preventive inoculation is chiefly of value in those exposed to special risks. It is not proved that wholesale inoculations during the course of the epidemic have any real effect; statistics in such cases are always ipso facto favourable to inoculation.

10. The greatest safeguard lies in the cultivation of a national, local, and personal hygienic sense which will realise that enteric fever (to quote Sir George Newman) "is definitely preventable and should be prevented," and will not stint the measures necessary to that end.

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MEDICINE AND THE LAW

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A FATAL X RAY ACCIDENT

To the Editor of THE LANCET

SIR,—I have read with much interest Dr. Burkitt's detailed account of the deplorable X ray fatality at Wimbledon Hospital. As an X ray operator of long experience who has held the diploma of the Society of Radiographers since 1922, may I be permitted to enter a protest? Dr. Burkitt says:—

> "It is not suggested, I presume, that all the radiography is to be done in the presence of the radiologist, since this would be impossible under present circumstances, and it is for this reason that we train radiographers to do the actual radiography by themselves."

This is just the trouble. Nurses, masseuses, and what not are sent to X ray departments to "help" and gain, after some months (sometimes years), a certain sleight of hand in making the adjustments of kilovoltage and milliamperage appropriate to the particular set installed, and in pulling out the right exposure switches. But send them to a new department in a different hospital where different conditions obtain and they are completely at sea; or if anything occurs that requires deviation from the usual routine in working their own sets, their parrot-like attitude goes by the board.

I have seen and checked some terrifying procedures by people with long practical experience but no theory behind it. In wards particularly, there is a dangerous slackness about making safe adjustments. The X ray tube is apt to be placed too near the bed rail (head bed rails should be removable), a frequent cause both of shattering the tube and of charging the bed. Another practice dangerous to bystanders is the slovenly habit of attaching tube leads to chairs. Ordinarily with the use of the modern earthed apparatus the accident at Wimbledon Hospital should have been impossible; but the nurse courted disaster by disregarding orders. I am very glad to see Dr. Burkitt insisting on the implicit obedience essential in an X ray department. It should be rendered quite apart from hospital rank, and rendered whether the order comes from the radiologist, the X ray sister, or the male radiographer in charge.

One simply must dissociate rule of thumb from the plotting out either of dosage or diagnostic exposures in X ray work. What we qualified radiographers really need is State registration to protect our profession and safeguard the public.

I am, Sir, yours faithfully,

AILEEN H. MOORE, S.R.N., M.S.R.

Chelsea, S.W., Sept. 22nd, 1933.

PANEL AND CONTRACT PRACTICE

A Survey of the Insurance Medical Service

Sir George Newman's report on the State of the Public Health for the year 1932 reminds us that the national health insurance scheme has now been working 21 years, and that the time is opportune to take stock of the position of the wage-earners of this country in respect of medical attention to-day compared with their position before the inception of the scheme. He points out that prior to 1913 medical needs were supplied to the more poorly paid workers by charity, to the better paid workers by clubs associated with trade-unions or friendly societies, and that in many instances the conditions under which the appointed practitioners served were far from conducive to good medical work; whereas to-day more than one-third of the total population are entitled by statute to a standard of service which no disinterested observer doubts is superior to that given before the passing of the first National Insurance Act.' This service is what the average citizen looks to his family doctor to provide: and, except under certain additional benefit regulations, does not include specialist services. General practitioner services however advance, and methods of treatment are now available which were unknown a few years ago. Every effort, Sir George says, will be made to improve still further the standard of clinical work done; one of the chief means to this end consists in reasonably full clinical records of illness. Whilst it is difficult to give demonstrable proof of the quality of this work, yet the number of complaints by insured persons to insurance committees regarding attention and treatment is negligible in relation to the size of the service, and that in spite of the fact that each insured person is informed on the card supplied to him that "any inquiry or complaint . . . should be addressed to the clerk to the insurance committee" at an address given. Further testimony is afforded by the regional medical officers who are in daily touch with practitioners and insured persons, and have unique opportunity of appraising the standard of work attained. Their experience is that, except in the case of a small minority of practitioners, the standard is not only high but is steadily advancing and without the former disadvantages of contract practice. Again information reaching the Ministry through medical officers of health leaves Sir George in no doubt that much of the gratifying improvement in the general public health is due to the increasing efficiency of practitioners.

The number of insured persons has increased from 15,803,000 in 1931 to 16,010,000 in 1932; the number of practitioners from 15,764 in 1931 to 16,783 in 1932. Of the insured persons 819,501 had not made arrangements for joining a doctor's list. The cost of medical benefit, excluding administration, amounted to £8,961,936, of which £6,734,050 was paid to practitioners, the remainder being spent on medicines and appliances. The supervision of prescribing is adopted solely to eliminate waste and not in any way to restrict the amount expended upon treatment. Each insurance practitioner is entirely free and is indeed under obligation to adopt the line of treatment and to order those medicines he considers best in the interests of the patient. When dealing with excessive cost an interview with friendly discussion between the regional medical officer and the practitioner in the first instance is still the policy of the Ministry; 945 practitioners were visited in 1932 as compared with 1427 in 1931, and in only one case was a deduction authorised.

The responsibility for the payment of a claim for sickness benefit rests with the approved society, and by far the most important piece of evidence is the practitioner's certificate of incapacity. The majority of practitioners are fully alive to their responsibility to the approved society and discharge it faithfully; there is evidence that the number falling short in these respects is decreasing. Such practitioners are interviewed by the regional medical staff and in most cases expressed their appreciation of the help gained in the discussion of these cases. As the duty of safeguarding the funds is in the hands of approved societies and they in turn depend upon the information supplied by doctors, it is very desirable

ÆTIOLOGY OF PELLAGRA

To the Editor of THE LANCET

SIR,—In a letter to your issue of Sept. 2nd (p. 567) Dr. Ellis asks: Can pellagra occur in the human subject when maize is excluded from the diet? and quotes evidence that it can. In support of this, the following details of a case of pellagra which I saw in a small Cambridgeshire village and afterwards treated in hospital may be of interest. The patient was a girl aged 8 and was the fourth child of a family of seven. The father was an agricultural labourer and the cottage in which the family lived was small, squalid, and dirty. The usual diet was as follows. Breakfast: jam, white bread and butter or margarine, and tea with a little milk. Dinner: pudding, potatoes, and custards. Tea: white bread and butter or margarine, jam, and cake. Eggs were obtained at times, but meat, fresh fruit, and green vegetables infrequently as they could not afford them. No maize was eaten. The youngest child, who was 1 year old, had rickets.

I am, Sir, yours faithfully,

LESLIE COLE.

Cambridge, Sept. 25th, 1933.

CONGENITAL UMBILICAL HERNIA

To the Editor of THE LANCET

SIR,—May I refer Mr. Freshman to Parsons and Barling's "Diseases of Infancy and Childhood" (vol. ii., p. 1573)? Surely operation ought to be reserved for those patients who manifest symptoms of obstruction rather than for "all cases." Mr. Freshman is to be congratulated on his success but, though I have had a similar experience, there are occasions on which it is wiser to do almost nothing, as Mr. George Waugh's good result (referred to above) quite clearly shows!

I am, Sir, yours faithfully,

ERIC I. LLOYD.

Harley-street, W., Sept. 24th, 1933.

NEMBUTAL IN LABOUR

To the Editor of THE LANCET

SIR,—In relation to Dr. Freda Kelly's excellent article on the use of nembutal in labour, I should like to mention that it is possible to prevent restless patients from rolling off the bed by fixing padded boards at the sides of it. I first saw these boards used at Prof. Gauss's clinic in Würzburg in 1931.

I am, Sir, yours faithfully,

ANDREW M. CLAYE.

Leeds, Sept. 24th, 1933.

THE SOCIAL WORKER IN THE MENTAL HOSPITAL

To the Editor of THE LANCET

SIR,—There is much in this article in your issue of Sept. 16th (p. 671) with which, in company with all those who are interested in the welfare of mental cases, I must agree. I must, however, take very serious exception to the paragraph in which reference is made to the Mental After Care Association, of which I have the honour to be the chairman. To say that, "hitherto these things have been done in a rough-and-ready way by coöperation between the hospital staff and such voluntary organisations as the Mental After Care Association," is to make a statement that is not true. This association has been doing "after care" work of a high order for 54 years, with a staff of skilled, trained, and devoted workers to the complete satisfaction of the London County Council and every other public body which has called upon it for its services. This, I think, is adequately shown by the fact that the appeals for the association's help have increased sevenfold during the past two decades. There is probably no body doing charita work that excels or even reaches this association the matter of strict economy of administration, none that in a more quiet and unobtrusive man gives its whole energies to the cause which it has m its own.

I am, Sir, yours faithfully,

R. WORTH,
Chairma

The Mental After Care Association, Church House,
Westminster, S.W., Sept. 21st, 1933.

***We are glad to be able from personal kn ledge to confirm all that Dr. Worth says.—ED. L.

A MEETING FOR MEDICAL MAGISTRATE

To the Editor of THE LANCET

SIR,—As you announced last week the Natio Council for Mental Hygiene is holding its th biennial mental health conference at the Caxton H Westminster, from Nov. 22nd to 24th. On Saturd Nov. 25th, at 10.30 A.M., at the Royal Society Medicine, there will be in addition a session of spe interest to medical justices of the peace on Medical Attitude to Crime. Lord Horder will t the chair and the discussion will be opened Dr. Hamblin Smith and Dr. R. D. Gillespie. At conference held two years ago there was a stro expression of opinion, emanating from magistra themselves, probation officers, and social workers, the urgent need for increased facilities for the bet information of justices on the psychological factors crime, especially in regard to juvenile and adolesc offenders. The proposed session represents an atte to meet this need.

As there is no register of magistrates kept by a central authority it has been difficult for us to into touch with medical justices. We shall theref be greatly obliged if you will give further publici to this meeting in your columns. Although organis especially for doctors who are magistrates, all memb of the medical profession will be welcome. Admiss is free but only by card of invitation, which may obtained from the secretary of the Council, ro 78, Chandos House, Palmer-street, London, S.W.1.

We are, Sir, yours faithfully,

R. D. GILLESPIE,
DORIS M. ODLUM,
Joint Hon. Secretaries, National Council
for Mental Hygiene.

Sept. 23rd, 1933.

"A DENTAL PIONEER"

To the Editor of THE LANCET

SIR,—I write to you in reference to your editori comment last week (p. 712) on William Dall's wor The dental profession has always had outstandi craftsmen of the Dall type. William Dall w undoubtedly one of the finest, and whenever or whe ever such a classic (the words are Sir Frank Colyer is produced, due appreciation should be show rather than the somewhat grudging and ungenero acknowledgment of this work. As a practic contribution to modern methods, this work is a advance of considerable value. Your note in referen to destruction of tissue is entirely inaccurate. Caviti having had their caries removed are afterwar merely finished to the shape—circular, half-roun oval, square, or rectangular—most suited to th cavity concerned. These inlays, suitably selecte entail less tissue destruction than many other method Dall's research on amalgam in 1898 reached a simila conclusion to Prof. Marie Gaylor in 1932. This boo is but a small quota of his energetic and origina research.

I am, Sir, yours faithfully,

S. J. F. WEBB.

Bishop's Stortford, Herts, Sept. 23rd, 1933.

A FATAL X RAY ACCIDENT

To the Editor of THE LANCET

SIR,—I have read with much interest Dr. Burkitt's detailed account of the deplorable X ray fatality at Wimbledon Hospital. As an X ray operator of long experience who has held the diploma of the Society of Radiographers since 1922, may I be permitted to enter a protest ? Dr. Burkitt says :—

> "It is not suggested, I presume, that all the radiography is to be done in the presence of the radiologist, since this would be impossible under present circumstances, and it is for this reason that we train radiographers to do the actual radiography by themselves."

This is just the trouble. Nurses, masseuses, and what not are sent to X ray departments to "help" and gain, after some months (sometimes years), a certain sleight of hand in making the adjustments of kilovoltage and milliamperage appropriate to the particular set installed, and in pulling out the right exposure switches. But send them to a new department in a different hospital where different conditions obtain and they are completely at sea ; or if anything occurs that requires deviation from the usual routine in working their own sets, their parrot-like attitude goes by the board.

I have seen and checked some terrifying procedures by people with long practical experience but no theory behind it. In wards particularly, there is a dangerous slackness about making safe adjustments. The X ray tube is apt to be placed too near the bed rail (head bed rails should be removable), a frequent cause both of shattering the tube and of charging the bed. Another practice dangerous to bystanders is the slovenly habit of attaching tube leads to chairs. Ordinarily with the use of the modern earthed apparatus the accident at Wimbledon Hospital should have been impossible ; but the nurse courted disaster by disregarding orders. I am very glad to see Dr. Burkitt insisting on the implicit obedience essential in an X ray department. It should be rendered quite apart from hospital rank, and rendered whether the order comes from the radiologist, the X ray sister, or the male radiographer in charge.

One simply must dissociate rule of thumb from the plotting out either of dosage or diagnostic exposures in X ray work. What we qualified radiographers really need is State registration to protect our profession and safeguard the public.

I am, Sir, yours faithfully,

AILEEN H. MOORE, S.R.N., M.S.R.

Chelsea, S.W., Sept. 22nd, 1933.

PANEL AND CONTRACT PRACTICE

A Survey of the Insurance Medical Service

Sir George Newman's report on the State of the Public Health for the year 1932 reminds us that the national health insurance scheme has now been working 21 years, and that the time is opportune to take stock of the position of the wage-earners of this country in respect of medical attention to-day compared with their position before the inception of the scheme. He points out that prior to 1913 medical needs were supplied to the more poorly paid workers by charity, to the better paid workers by clubs associated with trade-unions or friendly societies, and that in many instances the conditions under which the appointed practitioners served were far from conducive to good medical work ; whereas to-day more than one-third of the total population are entitled by statute to a standard of service which no disinterested observer doubts is superior to that given before the passing of the first National Insurance Act. This service is what the average citizen looks to his family doctor to provide; and, except under certain additional benefit regulations, does not include specialist services. General practitioner services however advance, and methods of treatment are now available which were unknown a few years ago. Every effort, Sir George says, will be made to improve still further the standard of clinical work done ; one of the chief means to this end consists in reasonably full clinical records of illness. Whilst it is difficult to give demonstrable proof of the quality of this work, yet the number of complaints by insured persons to insurance committees regarding attention and treatment is negligible in relation to the size of the service, and that in spite of the fact that each insured person is informed on the card supplied to him that "any inquiry or complaint . . . should be addressed to the clerk to the insurance committee" at an address given. Further testimony is afforded by the regional medical officers who are in daily touch with practitioners and insured persons, and have unique opportunity of appraising the standard of work attained. Their experience is that, except in the case of a small minority of practitioners, the standard is not only high but is steadily advancing and without the former disadvantages of contract practice. Again information reaching the Ministry through medical officers of health leaves Sir George in no doubt that much of the gratifying improvement in the general public health is due to the increasing efficiency of practitioners.

The number of insured persons has increased from 15,803,000 in 1931 to 16,010,000 in 1932 ; the number of practitioners from 15,764 in 1931 to 16,783 in 1932. Of the insured persons 819,501 had not made arrangements for joining a doctor's list. The cost of medical benefit, excluding administration, amounted to £8,961,936, of which £6,734,050 was paid to practitioners, the remainder being spent on medicines and appliances. The supervision of prescribing is adopted solely to eliminate waste and not in any way to restrict the amount expended upon treatment. Each insurance practitioner is entirely free and is indeed under obligation to adopt the line of treatment and to order those medicines he considers best in the interests of the patient. When dealing with excessive cost an interview with friendly discussion between the regional medical officer and the practitioner in the first instance is still the policy of the Ministry ; 945 practitioners were visited in 1932 as compared with 1427 in 1931, and in only one case was a deduction authorised.

The responsibility for the payment of a claim for sickness benefit rests with the approved society, and by far the most important piece of evidence is the practitioner's certificate of incapacity. The majority of practitioners are fully alive to their responsibility to the approved society and discharge it faithfully ; there is evidence that the number falling short in these respects is decreasing. Such practitioners are interviewed by the regional medical staff and in most cases expressed their appreciation of the help gained in the discussion of these cases. As the duty of safeguarding the funds is in the hands of approved societies and they in turn depend upon the information supplied by doctors, it is very desirable

able that these two partners should take all possible steps towards a good understanding of each others' point of view. This is shown to be recognised by the increasing number of conferences between local representatives of both sides where difficulties have been freely ventilated and confidence has been expressed that closer coöperation and a spirit of understanding can only result for good.

REGIONAL MEDICAL STAFF

The work of the regional medical staff has remained on the same basis as in 1931. They examined 626,853 insured persons who were referred; this was 17,479 less than in 1931, rather an abnormal year. In addition to visiting the comparatively few practitioners who are reported for excessive prescribing or over-certification they visit practically every doctor in their area once a year to examine dangerous drug lists, and to talk over matters relative to the efficiency of the service; 12,765 inspections of clinical records were made in 1932. Recently to the R.M.O.'s duties has been added the examination of unemployed people recommended for courses of vocational training, 10,820 being so examined during the year. They also examined 805 persons under the Workmen's Compensation Act for silicosis or asbestosis, 452 applicants for pensions under the Blind Persons Act. They assist the Ministry by providing valuable information on the local incidence of disease as seen in general practice.

Sir George Newman replies to criticisms of the regional medical staff. "Some of the critics," he says, "appear to be incompletely informed or to have forgotten how the service evolved . . . and it seems desirable to set down the facts." His chief points are these. In the original Act the commissioners had power to appoint referees but they did not do so; as a consequence approved societies appointed and paid their own medical men. When such a referee had to examine an insured person he notified the doctor attending of the fact, but he did not send him any report of his opinion, and there was no inter-communication between the two medical men. The fear arose and was expressed at medical meetings that these men were biased unconsciously in considering the interests of the society by whom they were paid. Consequently it was desirable that independent referees should be appointed by the commissioners. This was decided upon in 1914 but the war intervened, and it was not until 1920, after the absorption of the Insurance Commission by the Ministry of Health, that the regional medical scheme was organised. The selection of candidates was then entrusted by the Minister to a board on which the medical profession (including insurance practitioners) was strongly represented. The duties of this staff have grown as time went on in many directions, and whilst criticism is to be expected yet on the whole there is widespread appreciation of their work, witness the welcome afforded to them at meetings of the profession whether official or social.

MEASURES OF CONTROL

The control of the service for purely professional matters is, as Sir George points out, in the hands of the local medical committee who report to the local insurance committee; but where others are affected the investigation is in the hands of the medical service subcommittee, who also report to the insurance committee. If disciplinary action is suggested the doctor is notified and one month allowed for an appeal to the Ministry. If no appeal is received a departmental medical benefit subcommittee considers the reasonableness of any penalty suggested; they endeavour to ensure that penalties in different parts of the country for offences of similar gravity shall be comparable. If remuneration is to be withheld the doctor is invited to make representation either orally or in writing as to the amount. These are considered before the committee makes a definite recommendation. This again is not final, for it is considered by the Minister's advisory committee, a committee of six with the chief medical officer as chairman. The procedure ensures a fair and representative adjudication for doctor and patient without autocratic or arbitrary control.

In 1932 193 complaints were investigated, and in 66 a moiety of remuneration was withheld. Such withholding also occurred with 21 practitioners who failed to keep proper records. Six practitioners appealed to the Minister: two appeals were allowed, two were dismissed, one was withdrawn, and one was awaiting decision at the end of the year. Five insured persons appealed: one appeal was allowed, one dismissed, one withdrawn, and two were under consideration. There was one appeal by an approved society against the insurance committee's decision in favour of the practitioner; this was allowed.

A grant is made to assist doctors in sparsely populated rural districts where it would be impossible to earn a competence. Help to others is given for provision of telephone, branch surgeries, or towards maintenance of motor-cars, and for post-graduate study; in 1932 £3445 was paid for study, whilst the other items made up a total of £5300.

One conclusion to be fairly drawn from this report is that the efficiency of the service is now such that it cannot be compared with the days of contract practice before the Act, nor even with the earlier days of service under the Act. The work is definitely more arduous in that there is more skill required and expected by those who supervise its working and by the patients themselves.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Lts. T. W. Froggatt, D. R. F. Bertram, and M. A. Graham-Yooll to be Surg. Lt.-Comdrs.

The following appointments are notified: Surg. Comdr. J. B. Crawford to *Pembroke*, for R.N.B., Chatham. Surg. Lt.-Comdrs. (D.) D. H. le Marchant to *Pembroke*, for R.N.B., Chatham; and C. J. Finnigan to *Achilles*, on commg. Surg. Lt. H. J. McCann to *Achilles*.

ROYAL NAVAL VOLUNTEER RESERVE

Proby. Surg. Lt. H. T. Rylance to be Surg. Lt.

ROYAL ARMY MEDICAL CORPS

Lts. (on prob.) W. F. L. Fava and L. G. Irvine are restd. to the estabt.

ARMY RESERVE OF OFFICERS

The undermentioned, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.: Col. G. J. Houghton, late R.A.M.C.

TERRITORIAL ARMY

J. L. Orr (late Offr. Cadet, Univ. of Glasgow Cont., Sen. Div., O.T.C.) to be Lt.

FOREIGN DECORATIONS.—The Insignia Fourth Class (Civil Division) of the Order of Al R has been conferred upon Major Thomas John WEBB, Inspector-General of Health Services, Iraq King of Iraq, in recognition of valuable servic by him.

PUBLIC HEALTH SERVICES

Dr. Mearns Fraser's Last Report

THE issue of the health report for Portsmouth for 1932 marks the approaching retirement of Dr. A. Mearns Fraser, medical officer of health to the city for 37 years. To supervise the health of a town such as Portsmouth where issues may be complicated by conflicting authorities, by a fluid population, and by the presence of a garrison must present constant difficulties, and the city may well be proud of such a record. Dr. Fraser has seen the change of direction in public health work which occurred at the beginning of the century, the bias going from public sanitation towards personal hygiene and preventive medicine. The report demonstrates the vast improvements of the last 40 years; the financial return alone on expenditure on health matters during this period must run into millions of pounds. Thus in 1899 the deaths of infants under one year were over 190 per 1000 births; last year they were under 60. Dr. Fraser notes with satisfaction the effect of obtaining powers to regulate the sale and manufacture of ice-cream, under Section 92 of the Portsmouth Corporation Act of 1931. Contrary to expectation a great deal of money was spent in raising premises and equipment to a satisfactory hygienic standard, and only ten applications for registration had to be refused. Spirits and milk are still the greatest sufferers from adulteration, and some interesting comparisons are given between the analysis of the solids non-fat in milk by a newly installed Hortvet apparatus for estimating the freezing-point and the usual quantitative analytical methods. These showed that water may be added (in one case an employee was actually seen in the act) without the solids non-fat falling below the legal limit of 8·5 per cent.; the reverse also may occur—i.e., that the solids non-fat may be less than 8·5 per cent. without any evidence by the freezing-point method that water has been added. Dr. Fraser states that the extensions to the Milton Hospital for infectious diseases have not yet been carried out, and he deplores the fact that, owing to the laboratory at the Royal Portsmouth Hospital not being licensed for animal inoculations, specimens have to be sent to London at a high cost of money, convenience, and time.

Should Pneumonia Continue to be Notifiable?

Acute primary and influenzal pneumonia were made notifiable in 1919, following upon the pandemic of influenza. Their notification has never been satisfactory owing to a number of causes. In the first place pneumonia, not being generally regarded as infectious, is not classified in the doctor's mind with those diseases which he is accustomed to notify; in other words, he forgets to notify it. Secondly, since all cases of pneumonia are not notifiable the medical attendant becomes confused and does not notify any. Thirdly, there are the obvious difficulties in diagnosis; and lastly there is a conscious or unconscious feeling that nothing will be gained by notifying the case. From time to time it has been suggested that compulsory notification should be abandoned for the pneumonias, and in his annual report for the city of Leicester Dr. Killick Millard gives his support to the protagonists of this view. In Portsmouth, for example, the cases of pneumonia notified in 1932 numbered 59, while there were 58 deaths from these diseases, showing that (unless the mortality is in the neighbourhood of 98 per cent.) a number of cases cannot have been notified. In a large number of reports the unsatisfactory position is reflected in the lack of information given under this heading, but where serum or nursing assistance is provided by the local authority, as for instance at Woolwich (Dr. J. Macmillan), the notifications appear to be more satisfactory. Dr. J. J. Jervis (Leeds), however, takes the unusual view that in "many areas the incidence of pneumonia is so high that it would seem that practitioners are notifying certain cases of pneumonia which are really secondary to other conditions, such as measles and whooping-cough in childhood, and malignant disease in old age." Since all clinicians are agreed that cases of pneumonia stand removal very badly, it is to be hoped that notification results in the provision of extra nursing assistance rather than removal to hospital. Even if compulsory notification were to be abandoned for the country as a whole, areas such as Glasgow, where admirable work is being carried on in this group of diseases, would be able to retain their present powers.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 16th, 1933

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 6 (last week 2); scarlet fever, 2426; diphtheria, 1016; enteric fever, 52; acute pneumonia (primary or influenzal), 436; puerperal fever, 43; puerperal pyrexia, 101; cerebro-spinal fever, 16; acute poliomyelitis, 35; acute polio-encephalitis, 3; encephalitis lethargica, 3; dysentery, 21; ophthalmia neonatorum, 73. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Sept. 19th–20th was as follows: Small-pox, 10 (last week 15); scarlet fever, 1909; diphtheria, 1505; enteric fever, 11; measles, 403; whooping-cough, 256; puerperal fever, 18 mothers (plus 7 babies); encephalitis lethargica, 255; poliomyelitis, 5; "other diseases," 149. At St. Margaret's Hospital there were 23 babies (plus 13 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 1 (1) from enteric fever, 5 (1) from measles, 6 (0) from scarlet fever, 10 (1) from whooping-cough, 24 (4) from diphtheria, 96 (25) from diarrhœa and enteritis under two years, and 14 (0) from influenza. The figures in parentheses are those for London itself.

Of the deaths from diarrhœa outside London, 12 were reported from Liverpool, 7 each from Portsmouth and Sunderland, 5 each from Leeds and Birmingham, 4 from West Ham, 3 each from Gateshead and Rotherham.

The number of stillbirths notified during the week was 236 (corresponding to a rate of 39 per 1000 total births), including 42 in London.

YORK COUNTY HOSPITAL.—This hospital is to be extended by the erection of a new out-patients' department and a women's surgical ward, and the conversion of the existing out-patients' department into a massage and electricity section at a cost of £20,770. At the end of the present year letters of recommendation are to be abolished.

WATTON COTTAGE HOSPITAL.—A new wing of the Victoria Cottage Hospital at Watton, Norfolk, was recently opened by Sir Hamilton Ballance, consulting surgeon to the hospital, who remarked that hitherto the only access to the operating theatre had been through the matron's room.

OBITUARY

PHILIP EDWARD GLYNN, F.R.C.S. Eng.

Mr. Glynn died on Sept. 18th at Leeds, where he was resident orthopædic officer at the General Infirmary. Although only 27 years of age he had already equipped himself in no uncertain manner for the career of an orthopædic surgeon, and outstanding success was predicted for him. He received his medical education at Leeds, and on qualifying in 1929 became house surgeon to Mr. L. R. Braithwaite in the General Infirmary. After work as resident medical officer at the Ida and Robert Arthington Convalescent Hospitals, and casualty officer at the Barnsley Beckett Hospital, he spent some time at the Belgrave Hospital for Sick Children in London before beginning his orthopædic experience at the Harlow Wood Hospital. His last junior post was that of house surgeon at the Royal National Orthopædic Hospital, whence he took the Fellowship of the Royal College of Surgeons in 1932. In the same year he returned to the General Infirmary at Leeds as resident orthopædic officer. He became ill on Sept. 7th, two days before he was due to take a holiday, which characteristically he had planned to spend furthering his knowledge at the Scandinavian clinics and physical training centres. A colleague writes that he has rarely known anyone with such unbounded enthusiasm for his work or such unbridled energy in carrying it out. "He was undoubtedly one of the young men who saw visions. Even though, of necessity, he had been associated with orthopædics for only a few years, he was already showing leanings towards certain of its branches; one may mention fractures of the spine in particular. He had an inventive turn of mind and an original outlook on all problems, and there is no doubt that he would have gone far." A note by him on a single-handed method of reducing fractures of the tibia and fibula appeared in our columns early this year, and he was also the author of a paper on traumatic dislocation of the hip in children.

The funeral service, held in the infirmary chapel on Sept. 20th, was attended by many members of the honorary and nursing staffs, together with large numbers of students, colleagues, and personal friends, in addition to representatives of the British Orthopædic Association, the National Orthopædic Hospital, and the Harlow Wood Hospital.

CHARLES MIDDLETON COATES, L.R.C.P. Edin.

The death of Dr. Coates removes the senior member of a family which has practised medicine in Bath for three generations. Born in 1857, he was the eldest son of Charles Coates, F.R.C.P., one of the founders of the Coates and Ormerod fund of the Royal College of Physicians of London. He was educated at Harrow, at Trinity College, Cambridge, and at Edinburgh, where he qualified in 1893. After practising for some years at Creech-St.Michael, Somerset, he returned to his birthplace, Bath, and remained there from 1910 to 1932. He always took an active interest in outdoor games, and in this his sons followed him; the eldest, Dr. Vincent Coates, played Rugby football for Cambridge and as an international, while another played for Edinburgh. He married, first, Janet, daughter of Henry Rae, and had a family of four sons and one daughter. He died at his home in Edinburgh on Sept. 15th, and is survived by his second wife and by the children of his first marriage.

THE LATE PROF. EMBDEN

"Physiologist" writes: In the sudden death last July of Gustav Embden, of Frankfurt, physiology has lost one of her foremost investigators and best-loved teachers. Coming in his early years at Strasbourg under the influence of Hofmeister, his interest turned in the direction of the chemical changes occurring in tissues, and thereafter never wavered. His work on carbohydrate metabolism, and the origin of the acetone bodies in diabetes, will long be remembered. Of late years he had done much pioneer work on the chemical changes taking place during muscular contraction; his research in this field was often brilliant, sometimes controversial, but always stimulating. A popular teacher, a clear and forceful lecturer, and a magnet for young research workers, he will be well-nigh irreplaceable at Frankfurt; in the realm of research his loss will be felt in many universities throughout the world.

MEDICAL NEWS

University of Leeds

At recent examinations the following candidates were successful:—

M.D.

Rosie B. Becker and R. E. Tunbridge.

FINAL EXAMINATION FOR M.B., CH.B.

Part I.—F. H. B. Fuller, L. Rabinovitch, and E. Vining.

Part II.—F. M. Brook, A. Cohen, P. Crann, T. A. Divine, R. W. Rutter, T. Simpson, and Lydia A. Wilson.

Part III.—F. M. Brook, A. Cohen, P. Crann, T. A. Divine, R. W. Rutter, W. Sharp, T. Simpson, J. F. Warin, and Lydia A. Wilson.

FINAL EXAMINATION FOR L.D.S.

A. O. Ballard.

D.P.H.

Sarah N. S. Barker, G. M. Holliday, and J. C. Knox.

The Edward Ward memorial prize has been awarded to E. E. Blomfield and the West Riding panel practitioners' prize to K. O. Milner.

Society of Public Analysts

On Wednesday, Oct. 4th, at 8 P.M., this society will hold a meeting at Burlington House, Piccadilly, London, when communications will be made on the occurrence and origin of lead in canned sardines, and on the chemical examination of furs in relation to dermatitis. The hon. secretary is Dr. G. Roche Lynch, St. Mary's Hospital, W.2.

Chartered Society of Massage and Medical Gymnastics

The annual dinner was held at the Connaught Rooms on Sept. 20th, Mr. R. C. Elmslie presiding. The toast list was designedly short, in order to leave time for dancing after the more formal proceedings, but the speeches dealt with matters of great import to the Society. Mr. P. Rockliff discussed the possibility that the professional services of its members might in the future be officially recognised, as were those of dentists and opticians, in connexion with additional benefits under the National Health Insurance Act. At the present time the only centre where special physiotherapy was allowed as a benefit under the Act was the British Red Cross Society Clinic for Rheumatism, at Peto-place, London. Mr. Rockliff had gathered, from a leaflet published by the Society, that some resentment was felt that Benefit No. 16 was available only at charitable institutions. He suggested that members of the Society working in different parts of the country should equip themselves, by taking a course at the Red Cross Clinic, to give treatment for rheumatism when recognition was no longer confined to charitable institutions. A joint deputation to the *Ministry of Health from the Society and their friends* among the approved societies to discuss these matters might be timely, since in January of next year the fourth valuation of the assets of the approved societies was due and some new additional benefits would be compulsory. Fears had been expressed of the results of this valuation, but it was likely that some approved societies would show substantial surpluses. There were, moreover, means by which chartered masseurs and masseuses could give treatment for an insured patient, for example, under "Nursing Benefit" if the doctors certified the need for a nurse masseur; under a Distress Benefit also massage treatment might be available. Mr. Elmslie, responding for the Society, referred to the solid work done during the year. The training had been extended, the aim being finally to insist on two years' training, and an educational standard for entrance was being demanded. The formation, in coöperation with the British Medical Association, of a central register of persons qualified to give auxiliary medical services, had met with various delays, but would, he hoped, soon be completed. Members of the Society did not seek to gain fortunes from service under the approved societies, but only wished to work on a business basis which would ensure competent service, and not on a charitable basis. Dr. Anna Broman, proposing The Guests, spoke especially of the interest and understanding of professional requirements of members of the Society shown by Dr. Anderson. They did not want to work in isolation; members of the Society had pledged themselves to work always under doctors. The day was nearly over, she hoped, when a doctor would order massage and passive movements and hope never to see the patient again; but the day had not yet come when doctors really made full use of physical methods in treatment. Prof. Winifred Cullis, in reply, referred to her long and happy association with members of the Society. Dr. G. C. Anderson emphasised the keen interest taken by the British Medical Association in the promotion of the register, which would, he hoped, soon be completed, and would eventually lead to the formation of a State register. Its formation was not only in the interest of members of the Society, but also of the whole community. Dr. Justina Wilson proposed the Health of the Chairman with some amusing reminiscences of their early association in the massage department at St. Bartholomew's Hospital, and Mr. Elmslie briefly replied.

St. Paul's Hospital

A series of post-graduate lectures on urology, open to members of the medical profession and to students, will be held at this hospital at 4.30 P.M. on Wednesdays from Oct. 11th onwards (except Oct. 25th). The first, given by Mr. W. K. Irwin, will be on the diagnosis and treatment of some important bladder conditions. Particulars may be had from the secretary, St. Paul's Hospital, Endell-street, Holborn, London, W.C.2.

The Hospital for Sick Children

Last May a post-graduate course on diseases of children was held at this hospital, Great Ormond-street, London, many of the lectures being subsequently summarised in our columns (May 27th to June 10th). A similar course begins on Oct. 23rd and will continue till Nov. 4th. There will be sessions from 10 A.M. to 4 P.M. daily except Saturdays, and the full programme may be had from the secretary of the hospital.

Post-graduate Lectures on Sundays

The staff of Charing Cross Hospital have decided to hold another course of Sunday lectures during the present session, and these will begin on Oct. 8th. Each morning there will be two lectures, at 10.30 and at 11.45, and they will be open to post-graduates of any medical school. Details are obtainable from the secretary of the Charing Cross Hospital medical school, Chandos-street, London, W.C.2.

Post-graduate Lectures at Hampstead

The fourth winter session of post-graduate lectures at the Hampstead General and North-West London Hospital opens on Wednesday, Oct. 18th, at 3 P.M., with an address on Eugenics and the Doctor by Lord Horder; Sir John Thomson-Walker will preside. Further lectures will be given at 4 P.M. on Wednesdays, from Oct. 25th to Dec. 13th and their titles will appear each week in our Medical Diary

University of London

Forthcoming lectures.—Six lectures on the physiology of the sense organs will be given by Dr. R. J. Lythgoe at University College, Gower-street, on Mondays, from Oct. 9th. At King's College, Strand, Mr. W. Robson, D.Sc., will give four lectures on the metabolism of carbohydrates, fats, and proteins, on Thursdays from Oct. 12th, and Mr. J. W. Pickering, D.Sc., four lectures on blood plasma and platelets, on Tuesdays from Oct. 10th. All these lectures are at 5 P.M. and admission is free.

University of London Medical Graduates Society

The next extra-metropolitan dinner of this society will be held in Oriel College, Oxford, on Wednesday, Oct. 4th, at 7.45 P.M., with Lady Barrett, the president, in the chair. Tickets may be had from Dr. H. T. Gillett, 111, Banbury-road, Oxford.

University College Hospital Medical School

The session will open on Monday, Oct. 2nd, at 3.15 P.M., when Prof. A. E. Boycott, F.R.S., will deliver an inaugural address in the library of the medical school. Post-graduate demonstrations have been arranged for old students of the school on Thursday, Oct. 12th, and Friday, Oct. 13th, and on the Friday the annual dinner will be held at 7 for 7.30 P.M. at the Hotel Victoria, Northumberland-avenue, W.C., Dr. Hugh Roger-Smith presiding. The annual dinner of the U.C.H. Women's Medical Association will take place at the Piccadilly Hotel on the same day at 7.15 for 7.45 P.M.

University of Sheffield

The clinical medical studies committee of this university has arranged a series of post-graduate clinics, which will begin on Friday, Oct. 6th and continue until Sunday, Dec. 10th. Clinics on the main subjects will be held on Sundays, at 10.30 A.M., and on four Fridays, at 3.30 P.M. Clinics in special subjects will be held on four alternate Fridays at the same time. They will be held at the Royal Infirmary, the Royal Hospital, and the Jessop Hospital for Women. Further information may be had from the secretary of the committee at the university.

University of Wales

Welsh National School of Medicine.—The opening address for the new session will be given by Lord Horder on Oct. 6th, at 8 P.M., at the Institute of Physiology, Newport-road, Cardiff. His subject will be Medicine as a Career, and in the absence of the president of the school, the provost, Prof. A. W. Sheen, will preside. Members of the medical profession and others interested in the work of the school are invited to attend.

National Hospital, Queen-square

A post-graduate course will be held at this hospital from Oct. 2nd to Dec. 1st. It will include out-patient clinics at 2 P.M., and lectures and clinical demonstrations at 3.30 P.M. on each weekday except Saturday, and there will be demonstrations on the pathology of the nervous system on Wednesdays and Thursdays at noon, and on the anatomy of the nervous system on Tuesdays at noon. Demonstrations on methods of clinical examination will be held on Thursdays at 5 P.M. Further particulars may be had from the secretary of the hospital, Queen-square, London, W.C. 1.

Instruction in Venereal Diseases

A three months' course on venereal diseases will begin on Oct. 2nd at the municipal clinic, Salford. The clinic will be open for attendance daily from Monday to Friday (10 A.M. to noon; 5 P.M. to 8 P.M.), and lectures will be given on Thursdays at 11 A.M. from Oct. 5th. Applications should be addressed to the V.D. officer at 155, Regent-road, Salford 5, Lancs.

Post-graduate Work in Manchester

The series of lectures and demonstrations given each year at the Manchester Royal Infirmary has now begun and will continue on Tuesdays and Fridays at 4.15 P.M. Particulars may be had from Dr. E. Bosdin Leech, and the titles of the lectures will be announced weekly in our Medical Diary.

The Lloyd Roberts lecture will be given at 4.15 P.M. on Tuesday, Oct. 24th, at the St. Mary's Hospital, Whitworth-street, by Prof. Edward Mellanby, secretary of the Medical Research Council. His subject will be Nutrition and Childbearing.

National Special Schools Union

The biennial conference of this union will be held at the City Hall, Sheffield, from Oct. 5th to 7th. Dr. Henry Herd will speak on the future of special schools for mental defectives, Dr. Ralph Williams on open-air schools for delicate children, Dr. B. E. Schlesinger and Dr. A. Bremner on rheumatic children, and Dr. C. Lee Pattison on bone and joint tuberculosis. The local secretaries may be addressed at the Education Office, Leopold-street, Sheffield.

The Institute of Hygiene

At 3.30 P.M. on Wednesdays from Oct. 4th to Nov. 8th there will be lectures at this institute, 28, Portland-place, London, W., which will be open to members of the public. The subjects, in order, will be cripples and their care (Sir Henry Gauvain), diet in diabetes (Dr. J. Browning Alexander), low blood pressure (Dr. J. F. Halls Dally), sunlight and the skin (Dr. H. D. Haldin-Davis), health in winter (Dr. R. King Brown), and anæmia and diet (Dr. T. Izod Bennett).

Royal Institute of Public Health

A course of lectures on Citizenship in Relation to Personal and Public Health will be delivered at this institute, 23, Queen-square, London, W.C., on Wednesdays at 4 P.M., from Oct. 18th. The lecturers are: Sir Ernest Graham-Little (medical education and the public health), Dr. T. Drummond Shiels (citizenship in relation to social hygiene), Dr. D. H. Geffen (citizenship and parentcraft), Dr. J. H. Harley Williams (citizenship and tuberculosis), Dame Georgiana Buller (citizenship and the care of cripples), the Rev. J. C. Pringle (citizenship and charity), Dr. C. P. Blacker (citizenship and eugenics), Dr. Doris Odlum (citizenship in relation to mental health), and Miss Norah March (health education and propaganda). No tickets of admission are required.

The Harben lectures for 1933 will be given at the institute on Oct. 9th, 10th, and 11th, at 4 P.M., by Mr. J. C. Drummond, D.Sc., professor of biochemistry in the University of London. His subject will be modern views of the vitamins and their functions.

Lord Mayor Treloar Cripples' Hospital

The last section of this rebuilt hospital was opened last week without ceremony. The five ward blocks provide for the treatment of 300 crippled children, and a terrace, 1000 ft. long and 25 ft. wide fronting it, provides what is described as "a perfect open-air hospital." A full account of the hospital, with plans, was given by Sir Henry Gauvain, the medical superintendent, in THE LANCET of Feb. 11th, 1933 (p. 321).

Fire at a Tuberculosis Colony

In our issue of Sept. 16th (p. 673) mention was made of a fire causing much damage at the East Lancashire Tuberculosis Colony. Dr. E. L. Sandiland, medical superintendent, writes to say that the report was exaggerated. There was a fire in the fire-lighter department (involving the destruction of a store of naphthalene), but as this was separated from the rest of the industries there was no damage to the other departments.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

ROYAL SOCIETY OF MEDICINE.

TUESDAY, Oct. 3rd.—5.30 P.M., ORTHOPÆDICS. (Cases at 4.30 P.M.). Mr. St. J. D. Buxton: Some Observations on Injuries to Joints. (Presidential address.) Exhibits, Mr. A. H. Todd: 1. Photographs and Radiograms of Excision of the Elbow-joint for Comminuted Fracture. 2. Lantern slides of Osteochondritis of the Vertebræ.

WEDNESDAY.—5 P.M., HISTORY OF MEDICINE. Discussion: The Present Value of the Study of the History of Medicine. Opener: Sir StClair Thomson.

THURSDAY.—8.15 P.M., TROPICAL DISEASES AND PARASITOLOGY. Prof. E. Hindle: Recent Laboratory Contributions to the Control of Yellow Fever. Members of the Sections of Epidemiology and State Medicine, Pathology, and of the United Services are specially invited to take part in the discussion.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.

FRIDAY, Oct. 6th.—8.30 P.M. (at the West London Hospital), Mr. H. Tyrrell Gray: Principles and Practice. (Presidential address.)

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Oct. 2nd to SATURDAY, Oct. 7th.—METROPOLITAN HOSPITAL, Kingsland-road, E. Post-graduate Course in Medicine and Surgery and the Specialities, occupying the whole of each day.—ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, Leicester-square, W.C. Afternoon course in Dermatology. Clinical instruction daily and lectures twice a week.—LONDON CLINIC AND INSTITUTE OF PHYSICAL MEDICINE, Ranelagh-road, S.W. Evening course of lecture-demonstrations in Physical Medicine.—PANEL OF TEACHERS. Individual clinics are available by special arrangement with the Fellowship of Medicine. Courses, &c., are open only to Members of the Fellowship.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.

MONDAY, Oct. 2nd, to SATURDAY, Oct. 7th.—Intensive Post-graduate Course daily.

FRIDAY.—4 P.M., Dr. C. P. Symonds: Clinical Significance of Vertigo. (Annual address.)

NATIONAL HOSPITAL, Queen-square, W.C.

MONDAY, Oct. 2nd.—2 P.M., Dr. Riddoch: Out-patient Clinic. 3.30 P.M., Dr. Gordon Holmes: The Sensory System.

TUESDAY.—2 P.M., Dr. Walshe: Out-patient Clinic. 3.30 P.M., Dr. Carmichael: The Physiology of the Cerebro-spinal Fluid.

WEDNESDAY.—2 P.M., Dr. Martin: Out-patient Clinic. 3.30 P.M., Dr. Collier: Clinical Demonstration.

THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Dr. Riddoch: The Cranial Nerves and Special Senses.

FRIDAY.—2 P.M., Dr. Adie: Out-patient Clinic. 3.30 P.M., Dr. Gordon Holmes: The Sensory System.

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL, Denmark-hill, S.E.

THURSDAY, Oct. 5th.—4.30 P.M., Sir George Newman: Introductory Lecture to a course on Preventive Medicine. (Open to medical practitioners.)

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith-road, W.

THURSDAY, Oct. 5th.—Noon., Mr. A. J. Walton: The Surgery of Jaundice. (Open to medical practitioners.)

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.

TUESDAY, Oct. 3rd.—5 P.M., Dr. W. Griffith: Introductory.

THURSDAY.—5 P.M., Dr. J. M. H. MacLeod: Morphology and Histopathology of Elementary Lesions.

INSTITUTE OF HYGIENE, 28, Portland-place, W.

WEDNESDAY, Oct. 4th.—3.30 P.M., Sir Henry Gauvain: Cripples and their Care (Illustrated).

MANCHESTER ROYAL INFIRMARY.

TUESDAY, Oct. 3rd.—4.15 P.M., Dr. A. H. Holmes: Cerebral Aneurysms.

FRIDAY.—4.15 P.M., Dr. P. B. Mumford: Demonstration of Dermatological Cases.

Births, Marriages, and Deaths

BIRTHS

ARMITAGE.—Sept. 21st, at "Elmfield Lodge," Headingley, Leeds, to Mildred (née Hare), wife of George Armitage, M.C., F.R.C.S.—a daughter.

HEWER.—On Sept. 23rd, at Queen's-road, St. John's Wood, the wife of Christopher Langton Hewer, M.B., of a son.

WHITE.—On Sept. 23rd, the wife of Dr. R. White, of Nailsea, Som., of a daughter.

WOODD WALKER.—On Sept. 20th, to the wife of G. B. Woodd Walker, F.R.C.S., 19, Queen Anne-street, W.1—a son.

MARRIAGES

FORDE—RIDGWAY.—On Sept. 21st, at Shotwick Parish Church, Cecil L. Forde, M.A., M.B., B.Ch., of Birkenhead, to Cleonice Francesca, only daughter of Septimus and Frances Ridgway, of Wallasey.

MAHOOD—PARKER.—On Sept. 18th, Allan Edward Mahood, F.R.C.S. Eng., to Mary, third daughter of the late Joseph Parker, J.P., Buxton, Norfolk.

TEMPLETON—WILLIAMS.—On Sept. 16th, at St. Mary's Church, South Kensington, Percy Templeton, M.R.C.S., L.R.C.P., to Florence Maud Williams, widow of Frederick Ernest Williams, F.R.I.B.A., L.C.C.

DEATHS

CLARKE.—On Sept. 18th, suddenly, at Monkton, Mill-road, Worthing, F. Fielding Clarke, M.R.C.S.

COATES.—Charles Middleton, L.R.C.S., L.R.C.P., formerly of Bath, on Sept. 15th, at his residence, 7, Pentland-terrace, Edinburgh, aged 76 years, the eldest son of the late Charles Coates, M.D., F.R.C.P., of 10, Circus, Bath.

MACKENZIE.—On Sept. 24th, at The Circus, Bath, Alexander Linton Mackenzie, L.R.C.P.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

STERILISATION OF THE MENTALLY DEFECTIVE

By Henry Herd, M.B. Edin., D.P.H.
SCHOOL MEDICAL OFFICER, MANCHESTER EDUCATION COMMITTEE

At a time when sterilisation of the mentally defective is under the consideration of a Government committee, whose report is anticipated within a few months, it may not be inappropriate to make a short survey of the present position, endeavouring to be as impartial as possible on a subject apt to be provocative. Certainly it is one in regard to which extremely opposed attitudes are taken up. Particularly is this so from the religious point of view, with which I do not propose to deal, for the simple reason that it cannot be discussed with any profit. The religious objection is not a matter of argument; it is based on a difference of first principles. No arguments in favour of sterilisation, however soundly based on moral or racial grounds, are regarded by the religious objector as of any cogency.

The case for sterilisation is not quite so simple as is assumed by many who speak and write about it. Strongly worded utterances by distinguished members of the clerical and medical profession, by luminaries of the magisterial and judicial bench, by social and political propagandists, frequently reveal an imperfect appreciation of the very incomplete justification of the policy that is, as yet, available from the scientific point of view. In many of these utterances may be detected a tendency to regard the case for sterilisation as fully proved, and a consequent impatience with the hesitation of legislators to give it effect.

It is worthy of note that the most convinced and most ardent advocates of the policy of sterilisation to-day have receded considerably from the position that was taken up not many years ago—this is true at least of their public utterances. In the earlier days of the movement it was a national and a compulsory policy of sterilisation of defectives that was demanded. To-day the call is for an individual and a voluntary policy; a policy indeed, in comparison with the former, so mild as almost to disarm earlier opponents. It must not however be assumed that the demand for national and compulsory sterilisation has been abandoned more than temporarily. The change of front is simply a recognition of the fact that, at present, the compulsory policy is difficult to justify; the underlying hope remains that voluntary sterilisation may be a stepping-stone to something more substantial and effective.

The problem created by the existence of the mentally defective in the community is differently stated to-day than formerly. The assertion of the Mental Deficiency Committee of the British Medical Association that "there are large numbers of feeble-minded persons whose behaviour in the community is no more reprehensible, either socially or sexually, than that of persons not classed as mentally defective" is a departure from the belief frequently expressed by pioneers that they are responsible for the major portion of crime, poverty, prostitution, and illegitimacy. Delinquency is, as a matter of fact, much more frequent among those who are considerably above the mental calibre of the defective, and the children brought for treatment to a guidance clinic are only in rare instances defective. Assertions of the excessively large fertility said to be characteristic of defective families were, it is now admitted, exaggerated. Nevertheless, we must not run into the danger of understating the gravity of the problem. There appears, for example, to be little doubt that in the last 30 years there has been a real increase, though perhaps not very large, in the number of the feeble-minded. It is probably equally true that there has been a fall in the general level of intelligence in the community, and these two facts should not be studied apart from each other. There is a tendency to lay too much emphasis upon the smaller problem and to ignore the grave issues of the larger one. The racial dangers of the mentally defective have their source to a large degree in the wider social problem.

Inheritance of Mental Defect

It is advisable to survey some of the reasons which make it impossible now to justify a policy of national compulsory sterilisation of defectives. In the first place, the whole contention on behalf of sterilisation of defectives is based upon the alleged hereditary character of mental deficiency. (It is assumed, of course, that we are speaking throughout of primary mental deficiency). When, however, we study the evidence brought forward we find that the word "heredity" is used in a different sense from the usual. When heredity is spoken of in relation to such conditions as albinism or congenital cataract, it is meant that among the relatives of a patient suffering from these conditions may be found others who have also suffered from that specific trouble; but in the study of pedigrees of mental defectives it is very frequently found that there is no record at all of other cases of defect, but that certain members of the pedigree suffered from such conditions as epilepsy, insanity in one of its numerous forms, apoplexy, neurasthenia, and other psychopathic conditions. Dr. Tredgold's pedigrees, which were the result of very careful inquiry, show this very markedly, and Karl Pearson, and still more recently Mr. E. J. Lidbetter, have obtained similar findings. Mr. Lidbetter tells us that "a large number of family histories in my possession show that there is a definite relation between the various forms of mental disability, and that a large number of mentally defective children are born in families where there is a record of certifiable insanity." I have, on more than one occasion, certified defective children who were the offspring of the marriage of two highly neurotic persons, with no traceable history of defect in the family.

Dr. E. O. Lewis, of the Board of Control, who carried out the special inquiries made in six districts of different types for the Wood Committee on Mental Deficiency, made a further contribution to this subject when he asserted as a result of his investigation that the majority of defectives in the community are coming from a restricted group of families, and that this group includes in its numbers a much larger proportion of insane, epileptics, criminals, paupers, unemployed, prostitutes, inebriates, than does the rest of the community. They constitute indeed what he called a "subnormal" or "social problem" group which he thought may be about one-tenth of the whole population, and of whom defectives probably numbered about one-tenth. Lidbetter suggests that this group preserves its general characteristics from generation to generation, and does not often by intermarriage vitiate good stocks.

It will be obvious, from what has been said, that, when it is stated on the basis of evidence of the kind described that mental defect is hereditary, it is assumed that there is some factor common to all these varied pathological, mental, nervous, and anti-social manifestations. The assumption may be a perfectly correct one, but it must be remembered that it is nothing more than assumption; in any case, it adds further complexity to the question of the heredity of mental defect.

So far, however, as the proposal for sterilisation of defectives is concerned we are not so much interested in these preliminaries to the appearance of defectives in a stock (although for the full understanding of the heredity of defect this is vital), but rather with its sequelæ. The crucial question is, to what extent are defectives, whatever the ultimate causes of their defect, *producing* defectives in the next and following generations. Lidbetter may again be quoted on this point: "In a large number of cases," he says, "several generations intervene before the second defective appears and transmission occurs through the apparently normal member." "The evidence," he continues, "suggests that the normal siblings in a defective stock are almost as likely to have defective children as are the affected members." It is a matter of common observation by examiners of defectives that parents are often apparently normal, and a recent inquiry in Manchester into the mental condition of the children of some certified defectives showed a surprisingly large proportion of normal children. Evidence on this point, however, it must be admitted, is very conflicting. There are those who maintain that only about 5 per cent. or even less of the defectives in one generation are the progeny of defectives of the previous generation, but figures up to as high as 50 and 60 per cent. have been given by other investigators. The figures quoted appear to vary greatly with the grade of children included in the inquiry, being higher when the better grades of the feeble-minded are included. But whenever higher grades of feeble-minded are included in statistical returns there is always room for the criticism that many of these cases should not properly be called feeble-minded, and consequently that the figures given are mere illustrations of the fact that the sub-normal tend to beget the sub-normal, and, indeed, that the real underlying problem is that of the sub-normal in general.

One may be permitted to hope that the present Committee on Sterilisation has been able to obtain some reliable evidence bearing upon this point, for it is vital to any scientific basis for arguments either for or against the sterilisation of defectives. Meanwhile, it is very noteworthy that in a recent memorandum issued *in favour of* the Sterilisation Bill which it is proposed to bring before Parliament, the statement is made that "Probably not more than 10 or 15 per cent. of all defectives are the children of parents, one or both of whom are defective." The modesty of this claim in a propagandist pamphlet is significant. It must be added, however, that there is good reason to believe that the normal children of defective parents not infrequently become themselves the parents of defectives, and we cannot, in discussing sterilisation ignore the possible sequelæ of defect in later generations than the first. There is, however, on this point less reliable evidence than on the character of the first generation.

Biological Opinion

The contribution of biology to this subject has now to be considered briefly. Biologists have taught us much about the mechanism of heredity in general, and there is now in existence as remarkable a body of knowledge and of theory which appears to fit the facts regarding chromosomes and genes as there is regarding the atom in physical science. The method of inheritance known as Mendelian is now accepted by most biologists as of practically universal application. Morgan's work and that of other experimental biologists has not only confirmed it, but added very much to our knowledge of its details.

The main principles may be briefly stated. When two pure-bred individuals showing contrasts in respect of one particular character are mated, the first generation usually shows one of the characters only, this character being called the dominant, the other the recessive. In some cases there is an apparent blend of the characters, but that it is not a real blend is shown when individuals of the first generation are mated together, for the second generation then shows the two original characters again in the proportion of three dominants to one recessive. The recessives, if mated together, go on producing recessive characters perpetually, so also does one of the three dominants go on producing dominants, but the two other dominants are like those of the first generation.

Mendel knew all this, but the explanation in terms of chromosomes and genes is more recent. Chromosomes are conceived as made up of genes, and these genes are responsible for the presence of certain characters present in the individuals. In a child's cells one of any one pair of chromosomes is from the father, one from the mother; so also with genes. If the two genes of any one pair are both alike the individual will be pure-bred so far as the particular character determined by that gene is concerned. If they are different then the dominant will express itself in that individual but opposite genes may be handed on in inheritance. If, for example (I emphasise the "if"), we can imagine that feeble-mindedness was determined by one gene, and that a recessive gene (that assertion has been seriously made), then if a pure normal married a defective the offspring would be all normal but they would carry in their germ cells a pair of genes, one for normality and one for feeble-mindedness—i.e., they would be "carriers"—and in the next generation defectives would again appear, whether they married others similar or pure normals or defectives.

As I have said then, we know a great deal about the mechanism of inheritance in general, but of the application of that knowledge to the heredity of mental defect we know *virtually nothing*. *It is not even proved* that feeble-mindedness is inherited on Mendelian lines, and Tredgold declines to accept this explanation. Certain pedigrees, it must be admitted, do appear to suggest that feeble-mindedness is a Mendelian recessive, *others that it is a Mendelian dominant*. The general trend of biological opinion is towards a multi-factorial theory of its origin, but there is no certain knowledge. The Mendelian theory, however, does enable us to comprehend *how it may be possible for apparently normal parents* to have feeble-minded children and vice versa; the "carrier" is scientifically explained.

We are therefore thrown back upon pedigree evidence, and that is undoubtedly, as I have tried to point out, *inconclusive*. There *is indeed*, up to the present, no adequate scientific basis for a definite opinion on the possible results of a widely applied measure of sterilisation, and therefore no scientific basis for advocacy of a national compulsory measure. *If pedigrees prove anything, indeed*, it *is* that no radical reduction of the number of defectives in the community is possible unless one sterilises not only defectives but also the presumed normal carriers.

Some Incidental Advantages claimed for Sterilisation

Sterilisation, however, is not without the support of other arguments. Much the strongest in its favour is one which is not concerned with heredity at all, but depends upon the fact that parents, besides constituting a part of the child's heredity, are also parts of his environment. The efficiency of the defective as a parent, as in other functions, is sub-normal. If a father, his employment, even in times of prosperity, *may be a matter of uncertainty*; if a mother, she will be liable to display, and does in fact display, marked incapacity in the management of the home and the nurture of children. The whole development, both physical and mental, of the children *will be prejudicially affected*. *It is* probably on this account that early deaths are so common in the families of defectives. The frequently alleged propensity of defectives to produce families in average size larger than those of normals is almost entirely *offset by the* higher early death-rate. Parental inefficiency, however, both as it concerns the physical and mental development of their offspring is not confined to the defective class, and is not in itself a sufficient reason for sterilisation, especially on a universal scale.

Another argument, of which much has been s that by applying sterilisation a large num efectives now maintained in institutions ith safety, be released, since many of them e uite capable of living harmoniously in the n-unity. If it were the case that all defectives re ow in institutions that would be a strong argument, or colony training, particularly in America, has shown hat it is possible to train a large number of defectives n such a way that they may ultimately be returned o the community and behave there quite satisfactorily. Sterilisation of these would remove any anger attached to them from the racial point of view.

Unfortunately for this argument, however, *only* very small proportion indeed of defectives are in nstitutions, and of these far the largest number are f so low a grade that the question of their release *oes not arise. It is stated by superintendents of* nstitutions that only about 1 per cent. of cases could e released on this basis. Admission to institutions s in actual fact for individual reasons, not for racial. s the Wood report expressed it: " Sterilisation does ot make defectives more stable, does not enable hem to earn their living, does not prevent them rom getting into mischief, and does not enhance their ocial efficiency in any way." Sterilisation, that s to say, without socialisation only solves part f the mental deficiency problem.

It may, of course, be further contended in this onnexion that in view of the shortage of institutional ccommodation, particularly for high-grade defectives, terilisation would obviate the racial danger created y their presence in the community. Enthusiasm or sterilisation, however, must not blind us to the ecessity for consideration of the individual defective. t is the high-grade defective who gives the best rospects of socialisation by colony training, and here is a strong risk that if sterilisation became a ational policy the desirability of socialisation would e forgotten.

Effect of Legislation on Incidence of Defect

A further point which used to be urged in favour f compulsory sterilisation of defectives, but cannot ith so much force be put forward in favour of a oluntary scheme, is that sterilisation would, in the ourse of time, very variously stated in length, make substantial reduction in the number of defectives n the community. Attempts have been made to stimate what the results of sterilisation, carried out n a wholesale scale, would be. On the assumption hat mental defect is a Mendelian recessive, Prof. R. C. Punnett showed several years ago that sterilisation would decrease the proportion of defectives from ne in 100, which approximately is the proportion ow, to one in 1000 in 22 generations and from one in 000 to one in 10,000 in 68 generations. Stated in hat form, the policy of sterilisation appears scarcely o be worth while; but, as has been pointed out by R. A. Fisher, that method of statement gives a somewhat erroneous impression and conceals the fact that he most rapid steps would be in the early generations. In three generations the one in 100 would be reduced o just over one in 200. Even so, however, the rocess is obviously a slow one. If mental defect is ue not to one recessive gene but to several, as is more probable, the progress would be rather more apid, and if it also be true, as I have suggested, hat defectives tend to find their mates in the " social problem " group and do not select them from the whole of the population, that also would accelerate the progress. Here again, however, results would not be appreciable for many generations. All this numerical argument also depends upon the supposition that sterilisation is going to be applied to all defectives —a proposal which would not be tolerated and is not even made to-day. It is questionable indeed whether sterilisation as proposed in the Bill which it is intended to lay before Parliament would produce more than a very small fraction of the result indicated above. It is, therefore, not a matter for surprise that the Mental Deficiency Committee of the British Medical Association expressed in its report the opinion that a policy of sterilisation of defectives, even if widely applied, would not appreciably reduce the number of defectives in the population.

It is not now necessary, however, to press this point, for only a voluntary scheme is being demanded. It does require, however, to be made quite clear that if there are even doubts whether universal sterilisation of defectives would reduce their proportion to any considerable extent in the population, there can be no doubt whatever that voluntary sterilisation would have no practical effect in that direction at all. Voluntary sterilisation of defectives is, quite frankly, *no contribution whatever to the mental deficiency* problem from a national point of view; to think otherwise is to delude oneself.

This is fairly obvious from the experience of States *which have adopted the policy.* These States, mostly in the United States of America, are frequently quoted as examples of what should be done and what can be done, but they might with equal reason be quoted as examples of the futility of the policy from a national point of view. Up to 1928, 19 American States had passed laws legalising sterilisation; in 7 compulsory, in 5 voluntary, and in 7 both. Four more States had passed laws, but these were later declared to be unconstitutional and abandoned. In New York State it is admitted to have been a fiasco; other States have given it up. In only four have the laws been applied to any extent—namely, California, Kansas, Nebraska, and Oregon, and only in the first-named can it be said that the attempts to apply the laws have been serious. The law in California is that sterilisation with or without their consent may be applied to " any person who has been lawfully committed to any State Hospital for the Insane and who is afflicted with mental disease which may have been inherited and is likely to be transmitted to descendants, the various grades of feeble-mindedness and those suffering from perversion from normal mentality." In spite of the wide range of persons included, in 21 years only 6787 had been sterilised, and of these less than 1400 were defectives—an average of about 70 per annum. It is only necessary to mention this figure to make it obvious that no substantial contribution to the reduction of the dimensions of the mental defective problem is going to be effected in this way.

Advantages in Particular Cases

It seems clear therefore that there is no sufficient argument in favour of a scheme of compulsory sterilisation on a wide scale, and also that a scheme for voluntary sterilisation would result only in very limited benefit to the nation; but there cannot be the slightest doubt in the minds of workers among defectives that a measure which would make sterilisation of defectives for eugenic reasons a legal operation would be of individual and family benefit. The dangers of the unsegregated female mental defective from adolescence onwards are theoretically obvious and practically within the knowledge of social workers. It is clear, for example, that the procreative career of a woman who produced 17 children, 11 of whom were defective, mostly of imbecile grade, should have been ended at an early stage. This is an extreme case, but cases of similar, though not always of so startling, type are in the minds of most of the ardent propagandists of sterilisation and are largely responsible for much of the untutored advocacy of a wide measure of sterilisation which argues from the individual case to a generally applicable solution. As arguments, however, for a voluntary measure applied with the consent of patient, parents, spouse, and the Board of Control for individual and family benefit they are in my opinion unanswerable. It may be of course contended that the consent of a patient who is mentally defective is of very little value, but in such cases as we are now speaking of it is probably advantageous that the mentally defective are as a rule very suggestible. These cases however, let me repeat, form no argument in favour of wide measures of sterilisation. We can only argue from the individual case to the individual treatment, and there must be clear evidence of the hereditary nature of the defect in the individual case.

To summarise then what has been said, no general measure of compulsory sterilisation is justified, first of all on account of our ignorance of the method of transmission of the mental defect and, secondly, even assuming Mendelian transmission, by our inability to detect the "carrier"; it is literally true to say that we do not know who should be sterilised in order to eliminate the defective. Only a voluntary measure of sterilisation can, at the present time, be justified, but it is mere self-deception to believe that such a measure is going to reduce in any degree that matters the incidence of deficiency. Voluntary sterilisation of defectives can only be accepted as a temporary placebo designed for individual and family relief while we wait for science to clear up our ignorance of the underlying common factors which appear to determine the subnormal and the abnormal in the many forms which they assume. The smaller, though serious, problem of the defective will not be solved until the larger one of the subnormal and the abnormal is understood.

BRITISH INSTITUTE OF PHILOSOPHY

THIS institute exists to bring leading exponents of the various branches of philosophy into direct contact with the general public. The public evening meetings arranged for the autumn session 1933–34 are as follows: on Oct. 17th Prof. E. A. Milne will speak on the philosophy of physics; on Oct. 31st Prof. J. B. S. Haldane will speak on materialism; on Nov. 14th Prof. N. Kemp Smith will speak on Bergson's ethical teaching; on Dec. 12th Prof. W. D. Ross will speak on Plato and Aristotle in relation to modern thought. The following lecture courses will also be given during the Michaelmas term: Rev. Leslie Walker on philosophy in the middle ages, Mr. J. D. Mabbott on the philosophical approach to knowledge, and Mr. S. E. Hooper an introduction to speculative philosophy. The annual subscription is £1 1s., and the address of the institute is University Hall, 14, Gordon-square, London, W.C.1, where further particulars may be had from the director of studies.

Appointments

ANDERSON, B. W., M.B., Ch.B. St. And., has been appointed Deputy Medical Officer of Health and Asst. Tuberculosis Officer, Exeter.

FLATLEY, G. B., M.B., B.Ch., Asst. Resident Medical Officer, City of London Maternity Hospital, City-road, E.C.

REES, W. ESMOND, M.D., B.S. Lond., M.R.C.P. Lond., Honorary Assistant Physician to the Cardiff Royal Infirmary.

London County Council Hospital Staff.—The following appointments, promotions, and transfers are announced. A.M.O. (I.) and (II.) = Assistant medical officer, Grades I. and II. Temp. = temporary.

- BROWN, W. D., M.B. Camb., A.M.O. (I.), Lewisham.
- NICHOL, R. W., M.R.C.S., A.M.O. (I.), Hammersmith.
- ROBINSON, A. H. B., M.B. Melb., A.M.O. (II.), St. Charles's.
- BURBURY, WINIFRED M., M.B. Lond., A.M.O. (II.), St. Charles's.
- MCKENZIE, W. S., M.R.C.S., House Physician, St. James's.
- SCOTT, G. E., M.R.C.S., House Physician, St. James's.
- MILLER, A. A., M.B. Edin., D.T.M., Liverp., House Physician, Lewisham.
- PATON, R. McI., M.B. Lond., Temp. A.M.O., Lambeth.
- LENDRUM, CATHERINE E. L., M.R.C.S., Temp. A.M.O. St. Andrew's.
- MULVANY, D. K., M.B. Lond., Clinical Assistant, St. Giles.

Vacancies

For further information refer to the advertisement columns

Barnsley, Beckett Hospital and Dispensary.—Res. Surg. O. £300.

Barnstaple, North Devon Infirmary.—Res. M.O. At rate of £150.

Belgrave Hospital for Children, Clapham-road, S.W.—H.P. and H.S. Each at rate of £100.

Birkenhead Infirmary.—Res. M.O. £300.

Birmingham, Canwell Hall Babies' Hospital.—Res. M.O. At rate of £250.

[illegible]ham, West Heath Sanatorium, Northfields.—Jun. [illegible] rate of £200.

[illegible]roke Hospital, Wandsworth Common, S.W.—Hon. [illegible] Ear, Nose, and Throat Dept.

[illegible]l Royal Infirmary.—Hon. Pathologist and [illegible]

[illegible]l University.—Lectureship in Physiology.—£400.

B[illegible]ton-on-Trent General Infirmary.—Cas. O. and H.P.

C[illegible]ver Hospital, Fulham-road, S.W.—H.S. At rate of [illegible]

Canterbury, Kent and Canterbury Hospital.—H.S. and [illegible] Each at rate of £125.

Cardiff, Welsh National School of Medicine.—Jun. [illegible] Medical Unit. £[illegible]50.

Central London Throat, Nose, and Ear Hospital, Grays I[illegible] W.C.—Assts. in Out-patient Dept.

Chelmsford and Essex Hospital and Dispensary.—Res. M.O.

Chester Royal Infirmary.—H.S. £150.

Chesterfield and North Derbyshire Royal Hospital.—H.S. [illegible] rate of £150.

Croydon County Borough.—Asst. School M.O.H. and School M.O. £500.

Elizabeth Garrett Anderson Hospital, Euston-road, N.W. [illegible] Assts.

General Lying-in Hospital, York-road, Lambeth, S.E.—Jun. M.O. At rate of £100.

Gordon Hospital, Vauxhall Bridge-road, S.W.—Res. H.S. [illegible] rate of £80.

Grove Park Hospital, Lee, S.E.—Res. Asst. M.O. £350.

Guildford, Royal Surrey County Hospital.—Hon. Asst. Orth[illegible] Surgeon. Also H.S. £150.

Halifax Royal Infirmary.—Res. Surg. O. Also 3rd H.S. [illegible] rate of £250 and £150 respectively.

Hospital for Consumption and Diseases of the Chest, [illegible] S.W.—First and Second Asst. Res. M.O.'s. Each at [illegible] of £150. Also H.P. and Jun. H.P. for Frimley [illegible] Each at rate of £50.

Hospital for Diseases of the Skin, 71, Blackfriars-road, S[illegible] Registrar.

Huddersfield Royal Infirmary.—Jun. Cas. O. and Res. [illegible]thetist. £150.

Ipswich, East S[illegible] £120.

Leeds General In[illegible] £149.

Leeds University [illegible]

Leicester Royal I[illegible]

Lewisham Hospital, High-street, Lewisham, S.E.—Asst. M.O.

London Homœopathic Hospital, Great Ormond-street, W[illegible] Clin. Assts. in Various Depts.

London Hospital, E.—Second Asst. and Registrar to [illegible] Unit. £300.

Manchester, Ancoats Hospital.—Res. M.O. and H.S. At [illegible] of £150 and £100 respectively.

Manchester Royal Children's Hospital.—Res. M.O. and [illegible] Surg. O. Each at rate of £125.

Margate, Princess Mary's Hospital.—Res. Asst. M.O.'s.

Metropolitan Hospital, Kingsland-road, E.—Sen. and Jun. [illegible] Also Cas. O. Each at rate of £100.

Middlesbrough, North Riding Infirmary.—Sen. H.S. At [illegible] £200.

[illegible] School Dentist.

[illegible] Res. Asst. M.O.

[illegible]—Medical Officer.

[illegible]st. Radiologist.

[illegible] Surgeon. £250.

[illegible] At rate of £150.

Oldham, Boundary Park Municipal Hospital.—Res. Asst. [illegible] At rate of £200.

Parbold, Lancs, Wrightington Hospital.—Jun. Asst. M.O. [illegible] rate of £200.

Poole, Cornelia and East Dorset Hospital.—Hon. Asst. Ophth[illegible]

Portsmouth City.—M.O.H. £1500.

Princess Elizabeth [illegible] York Hospital for Children, Shadwell, [illegible] H.P., Cas. O. Each at rate of £125.

Queen Charlotte's Maternity Hospital, Marylebone-road, N.W. [illegible] Res. M.O. for Isolation Hospital. £200.

Redhill, Surrey, Royal Earlswood Institution.—Jun. Asst. [illegible] At rate of £250.

[illegible]*l.*—Hon. Radiologist.

[illegible] Two Surg. Regs. Each £[illegible]

[illegible]*y, N.*—Second Ophthal. [illegible] Med. Reg. £200. Also H.S. At rate of £70.

St. John's [illegible]—Res. M.O. £200.

St. Leonar[illegible] *N.*—Sen. Asst. M.O. £[illegible] Also [illegible]

St. Mary'[illegible] *d Children, Plaistow,* [illegible] Res. [illegible] At rate of £175 and £[illegible] respectively.

Salisbury, General Infirmary.—H.S. At rate of £150.

Sheffield Royal Hospital.—Ophthalmic H.S. £120.

Southend-on-Sea, County Borough.—Sen. Asst. M.O. for Munic[illegible] [illegible]

[illegible]*mary.*—H.P. At rate of £1[illegible]

[illegible]—H.P. At rate of £150.

Taunton and Somerset Hospital.—H.P. and H.S. Each at [illegible] of £100.

Taunton, Taunton and Somerset Hospital.—Sen. House M.[illegible] At rate of £150.

Warneford General Hospital, Leamington Spa.—Res. Cas. [illegible] and H.S. £150.

Warrington Infirmary and Dispensary.—H.S. £175.

Warwick, King Edward VII. Memorial Sanatorium, Hertfo[illegible] Hill.—Jun. Asst. M.O. At rate of [illegible]

Westminster Hospital, Broad-sanctuary, S.W.—H.S. to Ear, No[illegible] and Throat and Eye Dept. At rate of £[illegible]

Wigan, Royal Albert Edward Infirmary.—Res. Med. and Su[illegible] O. and Reg. £250.

The Chief Inspector of Factories announces vacancies f[illegible] Certifying Factory Surgeons at [illegible], Lanark; Watlin[illegible]ton, Oxford; Somercotes, [illegible]; Milborne Po[illegible] Somerset; and Lerwick, Shetland.